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ERRATA

Ref. Mammal Bones in the Buchan District, by N. A. Wakefield.

In Table 2, page 213, numbers for Cheiroptera should be corrected as follows:

	Recent	Pleistocene
cf. *Eptesicus pumilus*	1	3
cf. *Chalinolobus morio*	—	3
Tadarida australis	1	—

Ref. Preliminary Report on McEachern's Cave, S.W. Victoria, by N. A. Wakefield.

On page 371, column 2, line 14 should read—

"Layer, 196 particles from 207 mg."

Insert in references on page 383—

"Wakefield, N. A., 1966. Mammals Recorded for the Mallee, Victoria. *Proc. Roy. Soc. Vict.*, 77(2): 627-636."

Seebeck, John H. and Hamilton-Smith, E.: Notes on a wintering colony of bats.

Several words were inadvertently admitted from the above paper, published in the Nov. 1967 issue (Vol. 84, no. 11) of the *Victorian Naturalist*. On page 349, column 1, lines 13-17 should read:

"In the course of further examination of museum collections, McKean (pers. comm.) has seen one specimen from Melville Island, N.T. (Reg. no. C953, Natl. Mus.) and two from Alberton, Sth. Queensland (Reg. nos. J2756-7, Queensland Museum)."

F.N.C.V.

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Magnificent stand of White Mountain Ash, *Eucalyptus regnans*, in the Maryville State Forest

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The Victorian Naturalist

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Assistant Editor: R. H. J. McQueen, B.Sc., Dip.Ed.

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Front Cover:

This is a photograph, taken by Alan Owen, of the "Ghost Fungus" *Pleurotus nidiformis.*

Editorial

With this first part of Volume 84, the *Victorian Naturalist* appears with a new cover design.

When the previous cover design replaced the former plain one, it was responsible, together with an intense sales promotion program, for a tremendous increase in subscriptions and membership figures.

This new design is merely an extension of the already successful format of our magazine. It will allow, to a certain degree, the use of some of the larger illustration blocks which belong to the Club, and which, in the past, have been unable to be used due to their size.

As well as the new cover, there are one or two explanations necessary regarding some of the contents of the new volume.

"Bush Brushes", which has been appearing for the past few years, will not be replaced, but will bear a different title. It shall be called "Readers' Nature Notes and Queries".

A new series, called "Close to Nature", is primarily designed to encourage young folk and the non-specialist older person, to take more than a casual interest in the natural world of their own garden.

The remainder of the magazine will remain unaltered, and will be available, as in the past, to both the scientific and lay contributors. It is only through your contributions, illustrations, and notes, that the *Victorian Naturalist* continues to be successful, and I therefore look forward to receiving these from you in the coming months.

close to nature

How many of us realize just how close we are to nature; and with what little effort it can be studied?

From the fluttering moth at a lighted window, to the spiders in the darkest corner of our garden shed; the wonders of the natural world are numerous—to the careful and patient observer!

This month, we begin a series in which a look is taken at some of these creatures which make up this "world in the garden". The aim is not to provide a completely scientific treatise on each subject; but rather to provide enough general detail to stimulate an interest in the things around us.

If the series encourages us not only to look; but to see something in what we are looking at, then it will have served its purpose.

I was endeavouring to overcome the spring growth of grasses in my garden, in November of last year, when a small, colorful spider, no more than one-eighth of an inch in length, appeared on my hand. I was so taken by the coloring of royal blue and red on the upper side of the abdomen, that I raised my hand for a closer look. Immediately I moved my hand, the spider vanished—only to appear again on my left knee. Obviously, it did not crawl to this position, because a gap of six inches separated my right hand from my bent left knee. Its method of movement was revealed to me soon after—when it jumped from my knee to a grass blade close by.

I remembered at this point, having seen this little spider a few years previously in my garden, but had not studied it in any detail; but now I had the opportunity to do so, and I followed it in its series of jumps from glass-blade to grass-blade. Before each jump, the cephalothorax (front section of spider's body), was raised, or swung to either side, as if the spider was looking and selecting the most appropriate landing place. It was quite easy to follow the little chap, for his colouring in the sunlight was extremely vivid.

The third pair of legs on this spider are more evident than the other three pairs. These are the ones used to provide the jumping power, and are moved, whilst the spider is walking, in the same manner as the oars are moved in a single sculls boat-race, only much more quickly. The final section of these legs (tarsus), was white; as were the palps (appearing in most spiders as a pair of small extra legs at the front). With the swift movement of these legs and palps, it reminded me of a sparring boxer in white boots and boxing gloves.

Due to these quick movements and the apparently good vision, it was extremely difficult to photograph this little spider; but after quite a deal of

Fig. 1. x 8. The Gliding Spider, *Saitis volans*, provides a most attractive color combination of red, royal blue, black, white and brown.

Photo: *G. Ward*

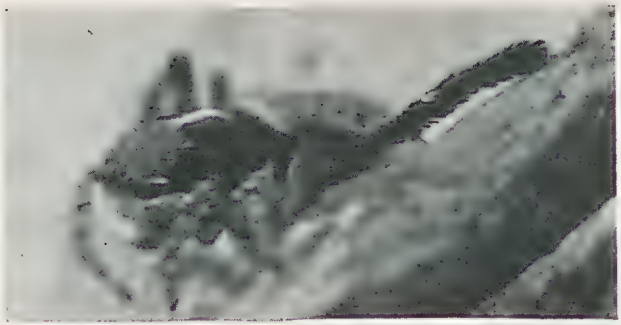


Fig. 2.

View of *Saitis volans* showing details of one of the 3rd pair of legs. It carries a series of comb-like hairs.

Photo: *G. Ward*

wasted film, I managed to obtain a few photographs of some of the interesting features.

The name of this spider is the Gliding Spider *Saitis volans*, and earns this from the ability to glide for a short distance during jumps. This is accomplished by the raising of small flaps, one on either side of the abdomen, to act as tiny wings while the spider is in flight. These flaps are almost invisible when not raised, but can be seen under a hand lens.

After having noticed this little spider, I came across three more forms of jumping spider, all during this same month of November. It would appear from this, that spring is an active time for the members of the family Salticidae. Unlike most other spiders, which hunt at night, these do their hunting during daylight, and they shelter at night in silken tubes or tents, woven between cracks in bark, or between the leaves of some bush.

The eyes of the jumping spiders are worthy of some comment. Most spiders have four pairs of eyes arranged in a definite order, which gives some indication of the species to which a certain spider belongs. This particular grouping of the eyes is called the "eye formula", and for the jumping spiders consists of one row of four in the front (fig. 3), and two rows of two, on top of the cephalothorax. The front four eyes of *Saitis volans* are of a beautiful bottle-green colour, and when looking through a lens, "eye to eye", they seem to convey a look of intelligence and impishness.

I was able to establish, in regard to the species which built the shelter shown in fig. 5, that a visional reaction was present when my hand, held 12 inches from and in front of the spider, was moved across the assumed line of vision. This reaction took the form of a short, quick, backward movement. It seems from this, that due to their method of stalking prey, their eyesight is perhaps better developed than other spiders.

There is another member of this

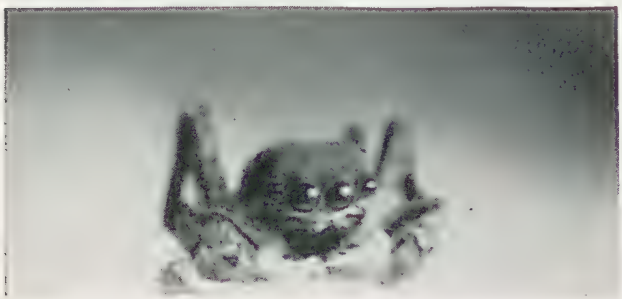


Fig. 3. Photo: *G. Ward*

The four forward pointing eyes of *Saitis volans*. The palps may be seen as white, curved portions in lower part of photograph, and were used on occasions to clean the eyes by wiping motions.

family which is fairly common, and this is the Grey and Black jumping spider, which may be found quite often on the sunny side of paling fences.

So, when next you are cleaning your unwanted grass, watch for members of this fascinating group of spiders. You may be able to add something of importance to the knowledge of their life history and habits.

For the confirmation of the species *Saitis volans*, thanks are due to Mr. Neboiss of the National Museum, Melbourne.

For further reading:—

Australian Spiders, Their Lives and Habits—by *Keith C. McKeown* (*Angus & Robertson*).
Know Your Australian Spiders and Ticks—by *B. Hadlington* (*Huntsman Press 1962*).
Spiders of Australia—by *Barbara York Main* (*Jacaranda Press 1965*).
Victorian Naturalist—**49**; April 1933, pp. 290-292.

Fig. 4 x 8 Photo: *G. Ward*

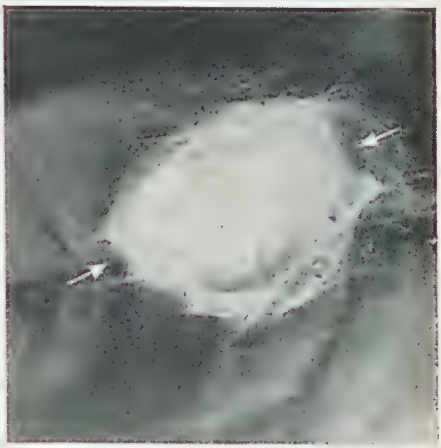


Fig. 5 x 3 Photo: *G. Ward*

Fig. 6 x 4 Photo: *G. Ward*

Fig. 4. Another species of the Salticidae family of Jumping Spiders. Note eye on side of cephalothorax.

Fig. 5. Silken shelter of yet another species, attached to a pittosporum leaf. Arrows show two entrances to shelter.

Fig. 6. The fourth member of the family. The abdomen in this species is more elongate than the other three species mentioned.

Some Taxonomic Revision in the Australian Marsupial Genus Bettongia (Macropodidae), with description of a New Species

By N. A. Wakefield*

1. Introduction

This study was initiated by the problem of identifying cranial fragments of *Bettongia* found in cave deposits in the Buchan area of eastern Victoria. The name *B. gaimardi* was used (Wakefield, 1960) for the specimens concerned, but only out of consideration of the near-coastal habitat and the priority in the genus of this specific name.

Both Troughton (1941) and Tate (1948) knew *B. gaimardi* only as a "lost" species from central-eastern New South Wales, and each was vague or doubtful as to whether it was specifically distinct from *B. penicillata.* Finlayson (1958) treated *B. penicillata* as a species almost Australia-wide in distribution, but gave no cognizance to *B. gaimardi.*

The present investigation was broadened to a study of morphological characters and geographical distribution of all species of the genus. Specimens were examined from the following sources:

National Museum of Victoria, Melbourne (NMV)
Fisheries and Wildlife Department, Melbourne
Australian Museum, Sydney (AM)
Macleay Museum, Sydney
Queensland Museum, Brisbane
South Australian Museum, Adelaide
Western Australian Museum, Perth
Tasmanian Museum, Hobart
Queen Victoria Museum, Launceston
American Museum of Natural History, New York (AMNH)
Museum of Comparative Zoology, Harvard University (MCZ)

In addition, data of specimens, including photographs and measurements, were obtained from:

British Museum (Natural History), London (BM)
National Museum of Natural History, Paris
Zoological Museum, Oslo University, Norway

Of the now-extinct mainland population of *B. gaimardi,* all sources together yielded only 7 adult skulls complete enough for suitable measurement. A series of 11 skulls of the extant Tasmanian population (syn. *B. cuniculus*) has been used to compare this island race with the *B. gaimardi* of the mainland; and the combined series of 18 specimens has provided data for comparisons with other species.

A series of 14 adult skulls of the extant south-western Australian population has been used to demonstrate characters of *B. penicillata.* Of the hitherto undescribed species in north-eastern Queensland, only 6 specimens were located (4 adults and 2 subadult); these however amply demonstrate a species of brush-tailed bettong distinct from both *B. penicillata* and *B. gaimardi.*

* Department of Zoology and Comparative Physiology, Monash University, Clayton, Vic.

In this study, the fourth species, *B. lesueur*, has been considered only sufficiently to distinguish it in general terms from the three brush-tailed species with which the present paper is primarily concerned.

Terms used for cranial measurements are either as standardized by Thomas (1888, p. viii), or are self-explanatory, or are as follows:

Rostrum Width. The maximum width at junction of maxillae and premaxillae.

Nasal Opening Width. The maximum internal width at the posterior end of nasal passage.

p^4–p^4 and m^4–m^4. The maximum distance, in each case, between outer edges of these teeth.

Bulla Length. From the anterior edge of the foramen lacerum posteriorum to the anteriormost part of the alisphenoid inflation.

Bulla Depth. The maximum vertical depth of the alisphenoid inflation below the horizontal condyloid surface of the glenoid fossa.

Unless otherwise indicated, measurements throughout the paper are in millimetres.

Range and mean of each measurement for each population are set out in Table 1.

The series have been compared for skull size on the basis of one measurement only—Basal Length. The more important consideration of cranial proportions has been based on the reduction of other dimensions to percentages of Basal Length; these proportions are summarized in Table 2.

Because of the smallness of the samples used in the comparisons, statistical significance has been assessed by the Mann-Whitney *U* test, as described by Siegel (1954).

Distributional data are shown in Text-figure 1.

2. The genus Bettongia

The genus was established by Gray (1837). Its species are distinguished by the combination of three "ill-defined characters" (Tate, *loc. cit.*): large palatal vacuities, inflated bullae, and the permanent premolar having 6 or more vertical grooves. There are four species.

Bettongia lesueur inhabits comparatively arid areas, living in warrens which it digs in sandy soil. Its fur is soft and woolly, and the dorsal hair of the tail is short (about 1 cm long). In these features of home and pelage, it is distinct from all other species of the genus.

In the other three species, the general pelage is of comparatively coarse hair, and the apical quarter to half of the tail carries a dorsal crest of long dark hair (to about 2 cm. long). Two of these species, and presumably the third, gather grass and similar materials, which they carry in the prehensile tail, to construct nests for daytime shelter. They are collectively referred to as the "brush-tailed bettongs" or "nest-building bettongs".

In cranial characters, *B. lesueur* is distinguished from the other species by (a) the proportionately shorter, "pinched-in" rostrum; (b) the major inflation of the auditory bullae (Bulla Length about 25 per cent, and Bulla Depth about 23 per cent, of Basal Length); (c) the large size of the premolars (p^4 length is about 14 per cent of Basal Length); and (d) the steep size gradient of the molars, with the m^4 very small.

All these cranial features appear to be specializations which contrast with a comparatively unspecialized state in *B. gaimardi* (rostrum long and broad, bullae not much inflated, premolars comparatively small, and molar gradient slight). Tate (*loc. cit.*) had similar thoughts in considering *B. cuni-*

culus (= *B. gaimardi*) to be the "most primitive of living *Bettongia*". Intermediate degrees of specialization are seen in the other two species of the genus.

3. Bettongia penicillata

Originally described by Gray (*loc. cit.*), the type specimen, from "New South Wales", is in the BM (No. 50.11.22.47; skull, 279f; skin, 298c). Of the skull, J. E. Hill states (*in litt.*, 4.7.1963): "pm^4 with strongly sloping external lateral alveolar rim, much lower posteriorly: axis of pm^4 flexed outward anteriorly: toothrows divergent (m^4–m^4 16.7; pm^4–pm^4 21.1)".

In lower as well as upper premolars, while the serrated sectorial edge of the tooth is approximately horizontal, the edge of the enamel adjacent to the alveolus is parallel to the alveolar rim. Consequently, the anterior edge of the grooved enamel is vertically about twice as long as the posterior edge. This shape, and the outward flexing of the premolars, are diagnostic of *B. penicillata* and distinguish it absolutely from the three other species of the genus*. (See Plate 1.)

The auditory bullae of *B. penicillata* are large, the tooth-rows converge posteriorly, and the fourth molars are small. (See Table 1.)

Normally, all the hair of the caudal crest, including the terminal tuft, is dark brown or black, but two exceptions are known: Waterhouse (1846) cites a specimen with a white terminal tail-tuft, and NMV No. 21764 from near Mildura has a similarly white-tipped tail.

There is a paucity of locality data for the eastern Australian population of *B. penicillata*. Thomas (*loc. cit.*) cited 3 New South Wales specimens (the type, and two from "Liverpool Plains" and "Namoi River" respectively) and 6 from South Australia (including two from "scrub near Adelaide", and the type of *Bettongia gouldii* (Waterhouse, 1846) from the head of St. Vincent Gulf).

Two other New South Wales specimens, AM Nos. A16792 and M1835, cited by Marlow (1958) as *B. penicillata*, are, in fact, *B. lesueur* and *B. gaimardi* respectively.

Krefft (1866) found the species abundant in 1857 about the Murray River from Euston (N.S.W.) westward. Apparently the nominate race, *B. penicillata penicillata*, extended from north-eastern New South Wales to the St. Vincent Gulf area of South Australia. In the present study, no assessment is made of either cranial or plastic characters of this form.

Waterhouse (1841) described a specimen from Swan River, Western Australia, as *Hypsiprymnus ogilbyi*. Examples (of *B. penicillata*) from south-western Australia were said to be "generally somewhat darker in the colouring of the feet and tail than those from New South Wales" (Waterhouse, 1846). In the Western Australian Museum there is a series of 18 skins, all from south of latitude 32°S and west of longitude 120°E, comprising about equal numbers of dark brown, medium brown and light brown specimens. The south-western Australian population is currently accorded subspecific status as *B. penicillata ogilbyi*. Thomas (*loc. cit.*) cited one BM specimen from "Shark's Bay, W.A.".

South Australian Museum No. M4140 is a skin-skull specimen of a very juvenile *B. penicillata* collected near Waldana Spring, about 125 miles north-west of Ooldea, South Australia. Finlayson (1958) gave details of reports which indicated a population of the species from the Ooldea area northwards to the Musgrave Range region

* In the Macropodidae the morphology of the permanent premolar appears to be more important in taxonomy than any of the other characters dealt with in this paper.

about the Northern Territory border. This suggests that there was a continuous distribution of *B. penicillata* from south-western to south-eastern Australia, in which case the validity of the present subspecific classification within the species (see Iredale and Troughton, 1934) is doubtful.

Finlayson (1957) described *Bettongia penicillata anhydra* from central-western Northern Territory (22°2'S, 129°47'E). The type specimen (South Australian Museum No. M3582) comprises a skull only, with much of its posterior part missing (see Plate 1). In this specimen, several features (short rostrum, very large bullae, and proportionately long premolars) demonstrate that it belongs not to *B. penicillata* but to *B. lesueur**.

Besides the deletion of the area of "*anhydra*", the distribution of *B. penicillata*, as shown by Finlayson (1958, fig. 2), must be reduced by at least the following areas:

(a) North-eastern Queensland, (b) Eastern Queensland (Dawson Valley), (c) South-eastern Queensland (Pine Mountain), and (d) Western Victoria (Grampians). Of these, (a) and (b) apply to the hitherto undescribed species (see Section 5), while (c) and (d) apply to *B. gaimardi* (see Section 4b).

4. Bettongia gaimardi

a. Typification:

The species was originally described by Desmarest (1822), as *Kangurus gaimardi*. It was based on a specimen (Paris Museum No. 79a), collected in 1819 during the voyage of the *Uranie*, and of which the author stated, "M. Gaimard l'a trouvé aux environs de port Jackson". The same specimen was also named *Kangurus lepturus* (Gaimard, 1824) and *Hypsiprymnus white* (Quoy and Gaimard, 1824).

Associated with this last description, drawings of animal and skull were published. The illustration of the animal cannot be regarded as accurate, for it has abnormally large ears and the tail is shown without the crest of long hairs.

Desmarest (*loc. cit.*) described the tail as "gris-roussâtre devenant plus foncé et passant au brun dans le bout", while Quoy and Gaimard (*loc. cit.*) said "son extrémité est terminée par un bouquet de poils". J. Dorst states (*in litt.*, 4.7.1963) that "the type of the species is in very poor condition, especially the tail is badly damaged and the hairs are worn out. It does not show any crest [but] there is a very faint indication that perhaps there was one; there is no indication of a white apex".

The illustration by Quoy and Gaimard of the type skull is reproduced in Plate 1. It shows the grooved surfaces of the premolars to be long horizontally and shallow vertically, though the outer alveolar rim of the p^4 is shown with more slope than is normal in the species.

Associated at present with the type skin is a skull (Paris Museum No. A2650) of *B. penicillata* (see Plate 1). The incomplete state of this specimen and the features of its premolars show that it is not the type skull illustrated by Quoy and Gaimard. It has the appearance of a skull picked up in the field after having been damaged by scavengers. Apparently the type skull is now lost.

Fortunately, Waterhouse (1846) recorded descriptions of both pelage and skull of the type specimen of *B. gaimardi*. He described the tail as "of a brightish rust colour above, paler

* The skull is very small (Zygomatic Width 37.1, m^{1-3} 10.5) but with Bulla Depth 11.7 and p^4 Length 7.6. The proportions Bulla Depth/Zygomatic Width (31 per cent) and p^4 Length/m^{1-3} Length (72 per cent) are those of *B. lesueur* and exceed maximum values for corresponding proportions in each of the other three species.

beneath, the apical third clothed on the upper surface with longish, bushy, brown-black hairs, but at the extreme point with a few white hairs".

Waterhouse's measurements (converted to metric scale) for the type skull are:

Total length of cranium, 74·1
Zygomatic Width, 42·3
Nasals Length, 30·7
Nasals, greatest width, 14·4
Nasals, width at anterior end of premaxillae, 6·3
Interorbital Width, 19·8
p^4 Length, 7·9

Troughton (*loc. cit.*) stated:

The animal was said to have been taken in the interior of the "Montagnes-bleues de la Nouvelle-Hollande", referring to the eastern slopes of the range west of Sydney.

This is a misinterpretation of the following notes which Quoy and Gaimard (*loc. cit.*) appended to their description of *Hypsiprymnus white:*

Dans un voyage que nous fîmes dans l'intérieur des Montagnes-bleues de la Nouvelle-Hollande, nous eûmes occasion d'en voir un . . . . Nous croyons que c'est une variété de l'espèce que nous venons décrire.

Actually, the two Frenchmen went inland as far as Bathurst, on the road constructed in 1815 across the Blue Mountains. There is apparently no record in the literature as to how and precisely where Gaimard obtained the original specimen of *B. gaimardi.*

b. Mainland Distribution:

The BM has three specimens, two from "New South Wales" and a third without record of locality.

[One of the former, No. 41.1140, was reported by R. E. Hill (*in litt.*, 25.5.1963) to have originated from "Liverpool Plains", but later (*in litt.*, 6.7.1966), he expressed doubt on the point and remarked that Thomas (*loc. cit.*) had noted no such locality for it.]

In the AM there are three specimens:

No. 1121. Pine Mountain, south-eastern Queensland. A juvenile skull. (Collected about 1869.) (This specimen is identified as *B. gaimardi* because of the morphology and size of the p^3, the grooved enamel of which is 2·4 mm. in vertical depth at both anterior and posterior ends, as compared with about 4 mm. and 2 mm. respectively for these measurements in *B. penicillata.*)

No. S583. Campbelltown. An adult skeleton. (Registered in 1896.)

No. M1835. Balmoral. A subadult skin and skull. (Registered in 1906.)

In the Macleay Museum there are an adult skull and a subadult skull, neither with locality data. Presumably they are from eastern New South Wales. Their cranial and dental dimensions are of the small mainland race, not the large Tasmanian form.

In the NMV there are 7 specimens:

No. C2448. Upper Yarra. A mounted skin. (Registered in 1877.)

No. C2450. "Melbourne". A mounted skin. (Received in 1867.)

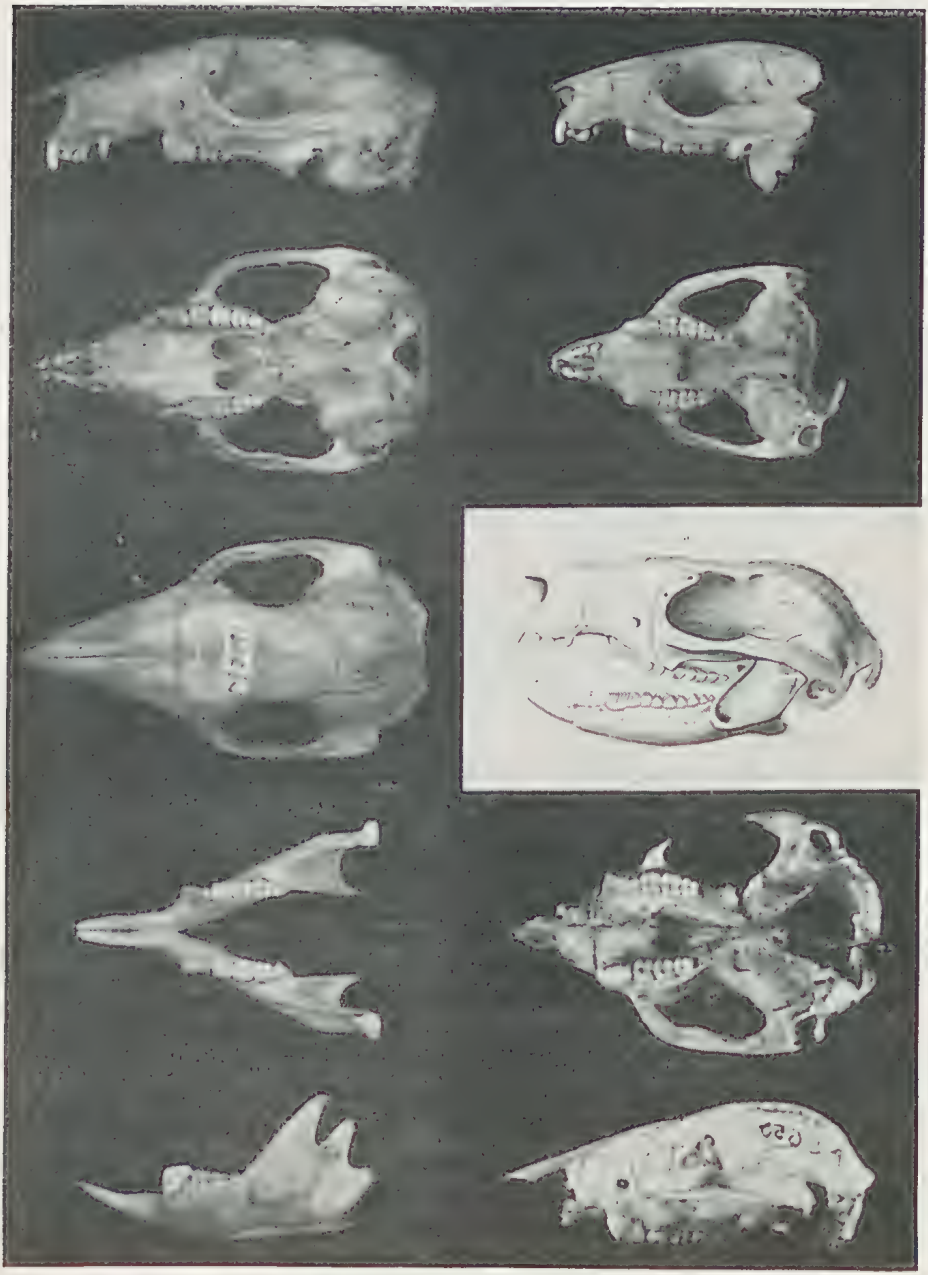
No. C6865. "Melbourne". A subadult skeleton. (Received in 1869.)

No. C6866. Goulburn River. A subadult skull. (Received in 1861.)

Nos. C6867, C6868, C6869. "Victoria". Adult skulls. Re-registered in 1902, from "old collection".

The one-time distribution of *B. gaimardi* in western and south-western Victoria is evidenced by the occurrence of skeletal remains in caves at Mount Hamilton, the Grampians, and near Portland (Wakefield, 1963a, 1963b, 1963c). One sub-fossil cranium (NMV No. P20674), from Fern Cave near Portland, is obviously of modern age.

Finlayson (1958) stated that he had "accounts of a nest building bettong from West Victoria generally in 1854, and the Grampians district in



Cranial Details of *Bettongia.*

Left side: Specimen of *Bettongia penicillata ogilbyi* (AM No. M3092).

Right side:
- Upper—Type specimen of *Bettongia penicillata anhydra* (S. Aust. Mus. No. M3582).
- Middle—Illustration by Quoy and Gaimard of type skull of *Bettongia gaimardi.*
- Lower—Specimen A2650, Mus. Nat. Hist. Paris (Lower illustration is mirror image of right side of skull).

1910", and he assumed that these applied to *B. penicillata.* However, they are far more likely to have referred to *B. gaimardi,* as there is no valid record, sub-fossil or otherwise, of *B. penicillata* in any part of Victoria except the extreme north-west (ref., Wakefield, 1966).

Finlayson (1959), in identifying fossil specimens from Tantanoola (far south-eastern South Australia) as "a somewhat microdont phase of *B. cuniculus",* unwittingly made a nice identification of *B. gaimardi* and foreshadowed the taxonomic conclusion which is reached in the next subsection of the present paper. Brazenor (1950) had already listed *B. cuniculus* as a one-time Victorian species but without indication of the basis of the record.

The mainland population, presumably now extinct, occurred as a modern animal about the Eastern Highlands and adjacent coastal tracts of south-eastern Australia, from south-eastern Queensland to south-western Victoria. It should be classified as the nominate subspecies with the trinomial *B. gaimardi gaimardi.*

c. Further Taxonomy:

Ogilby (1838) described a specimen, which he cited as from "Hunter's River, New South Wales", as *Hypsiprymnus cuniculus,* and he gave data of external features only.

Waterhouse (1846) suggested that an error of locality had been made in this case and that the specimen actually originated in Tasmania. He cited measurements of the type skull which, converted to metric scale, included: Nasals Length 35, Nasals Greatest Width 17, p^4 Length 8·2. Thomas (*loc. cit.*) reported further data of the teeth: M^{1-3} 13·8, m^4 Length 4·0. All these measurements suggest a Tasmanian specimen (see Table 1).

The Tasmanian animal is given specific status in current literature (Iredale and Troughton, *loc. cit.*; *et al.*) as *Bettongia cuniculus.* However, its dentition and, with one exception, its cranial proportions, are not significantly different from those of the mainland *B. gaimardi.*

In linear dimensions, as indicated by Basal Length of skull, the Tasmanian animal averages about 10 per cent larger than the mainland form. (For this comparison, $p<0·002$.)

In proportion to Basal Length, the auditory bullae are significantly longer in the mainland form than in the Tasmanian. (In the comparisons of Bulla Length/Basal Length, $p<0·02$.)

Referring to the type specimen and two others in the BM, J. E. Hill observed (*in litt.,* 3.4.1963): "The type specimen agrees well with the other two specimens and has a tail crest of short, dark brown hairs extending only for the terminal quarter of the length of the tail. Specimens referred to *B. gaimardi* have a tail crest of longer, blackish hairs, extending over the terminal half of the length of the tail."

The larger size, the proportionately less developed bullae, and the less developed caudal crest, are sufficient for the island population to be given subspecific status, with the trinomial *B. gaimardi cuniculus.*

d. General Characters:

The dorsal body colour of *B. gaimardi* is light brown ticked whitish, merging to whitish beneath. This is apparently a uniform character, in contrast to the individual variation noted in *B. penicillata.* The pelage of *B. gaimardi* is about the same as that of the lighter variants of *B. penicillata.*

Typically, the long dark hairs of the caudal crest give way to a white tuft which comprises the apical ½ to 1½ inches of the tail hair.* An exception

* In several museum specimens, the apical part of the tail and the white tuft has been lost due to careless skinning.

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is provided by a single Tasmanian skin which had only "a few silver-grey hairs in the tail tip" (R. H. Green, *in litt.*, 22.5.1963).

In summary: The white tail-tip is almost invariably present in both population of *B. gaimardi* but is almost invariably absent in *B. penicillata.*

In Tables 1 and 2 there are data of 7 specimens of *B. gaimardi gaimardi*: BM No. 55.12.26.199; AM No. S583; NMV Nos. R2177, R2178, R2179, P20674; Macleay Museum No. M1166.

Besides the differences of shape and insertion of the p^4, the cranial proportions that distinguish *B. gaimardi* from *B. penicillata* are:

(a) Interorbital region less constricted (Interorbital Width greater).

(b) Rostrum less tapered (Nasal opening wider).

(c) Bullae less inflated (Length and Depth each less).

(d) Larger molars (m^{1-3} Length and m^4 Length each greater).

(e) Tooth-rows closer to parallel (p^4–p^4 Width less, m^4–m^4 Width greater).

In all eight relevant comparisons, the differences between the two species are highly significant ($p<0.002$ in each case.

5. Bettongia tropica sp. nov.

a. Diagnosis:

Bettongia; similar in size, pelage and caudal crest to both *B. gaimardi* and *B. penicillata*; similar in cranial proportions to *B. penicillata;* interorbital width less, rostrum narrower, bullae much larger, than in *B. gaimardi*; permanent premolars inserted and shaped as in *B. gaimardi* but longer, neither anteriorly flexed outward nor with anterior edge vertically long as in *B. penicillata;* molars similar to those of *B. gaimardi* but the fourth smaller, all larger than in *B. penicillata.*

b. Type Specimen:

NMV No. C6870 (ex MCZ No. 29207). Adult male, skin and skull. Mount Spurgeon, 3700 feet, north-eastern Queensland. Collected July 24, 1932, by P. J. Darlington. Plate 3, left side.

Total Length 657; Tail 320; Pes 124; Ear 38; Claws of Manus (in order) 7, 11, 13, 11·5, 7; Claw of 4th Digit of Pes 17.

General dorsal coloration brown ticked whitish; individual hairs bluish-grey at base, subterminal zone pale grey, terminally rich brown; guard hairs silver. Crown and face dark brown, about ears fawn, ears medium brown. Sides pale brown; underparts, from throat to belly, pale bluish-grey. Beneath tail with long appressed hair, rufous for first few centimetres then silvery; above tail similar to body for first few centimetres, then silver guard hairs gradually replaced by dark hairs which eventually form the dorsal brush of dark brown to black hair reaching maximum length (about 20 mm.) on terminal 10 cm. of tail; no whitish tail tip. Front limbs with long hair, which is especially noticeable (about 10 mm. long) on manus and digits. Hind limbs with short appressed hair which becomes long (about 10 mm.) on 4th digit; feet dull pale brown.

Cranial Dimensions: Basal Length 65·5; Zygomatic Width 41·8; Interorbital Width 16·6 approx.; Nasals Length 28·9; Nasals, Greatest Width 13·2; Rostrum Width 13·8; Nasal Opening Width 7·5; p^4–p^4 19·4; m^4–m^4 17·0; Palatal Length 42·5; Anterior Palatal Foramen Length 2·9; Bulla Length 14·2; Bulla Depth 10·8, 11·0; p^4 Length 8·4; m^{1-3} Length 12·6; m^4 Length 3·0, Width 2·8.

TABLE 1

Cranial measurements of Species of *Bettongia* (in millimetres).

In each case the upper figures give the Range and the lower figure, in parenthesis, is the Mean.

	B. gaimardi gaimardi 7 specimens	*B. gaimardi cuniculus* 11 specimens	*B. penicillata ogilbyi* 14 specimens	*B. tropica* 4 specimens
Basal Length	63.2-67.5 (64.4)	67.8-73.3 (70.6)	61.1-73.0 (66.5)	63.4-65.5 (64.2)
Zygomatic Width	40.3-43.4 (42.2)	42.4-46.5 (45.3)	38.5-45.8 (42.2)	40.1-41.8 (41.2)
Interorbital Width	17.2-20.0 (18.5)	18.1-21.0 (19.9)	15.9-18.8 (17.4)	13.5-18.0 (15.8)
Nasals Length	29.9-31.7 (30.8)	33.3-36.2 (34.7)	28.6-36.5 (32.5)	27.6-32.5 (29.6)
Nasals, Greatest Width	12.3-15.8 (13.9)	12.0-16.0 (14.5)	11.1-15.5 (13.5)	13.1-14.3 (13.5)
Rostrum Width	14.6-16.0 (15.4)	16.0-18.6 (17.4)	13.7-17.6 (16.0)	13.7-15.0 (14.3)
Nasal Opening Width	7.9-9.5 (8.7)	8.6-9.8 (9.1)	7.0-9.3 (7.9)	7.3-8.3 (7.8)
Bulla Length	11.7-12.6 (12.1)	11.7-13.0 (12.5)	12.4-15.6 (14.2)	13.4-14.2 (13.8)
Bulla Depth	8.4-9.9 (9.1)	8.7-10.3 (9.5)	9.2-11.6 (10.6)	10.6-11.0 (10.9)
P^4–P^4 Width	18.9-20.5 (19.7)	20.5-23.3 (21.7)	19.0-23.5 (21.5)	19.4-20.9 (20.0)
M^4–M^4 Width	17.9-19.9 (18.8)	19.1-21.6 (20.4)	15.0-18.8 (16.8)	16.4-18.3 (17.2)
P^4 Length	6.7-7.5 (7.2)	7.7-8.9 (8.1)	6.5-7.6 (7.3)	7.8-8.6 (8.3)
M^{1-3} Length	12.0-13.4 (12.8)	13.0-14.2 (13.7)	11.4-13.8 (12.4)	12.6-13.6 (13.2)
M^4 Length	2.9-3.8 (3.3)	3.2-4.4 (3.8)	2.2-3.0 (2.6)	2.6-3.0 (2.8)

TABLE 2

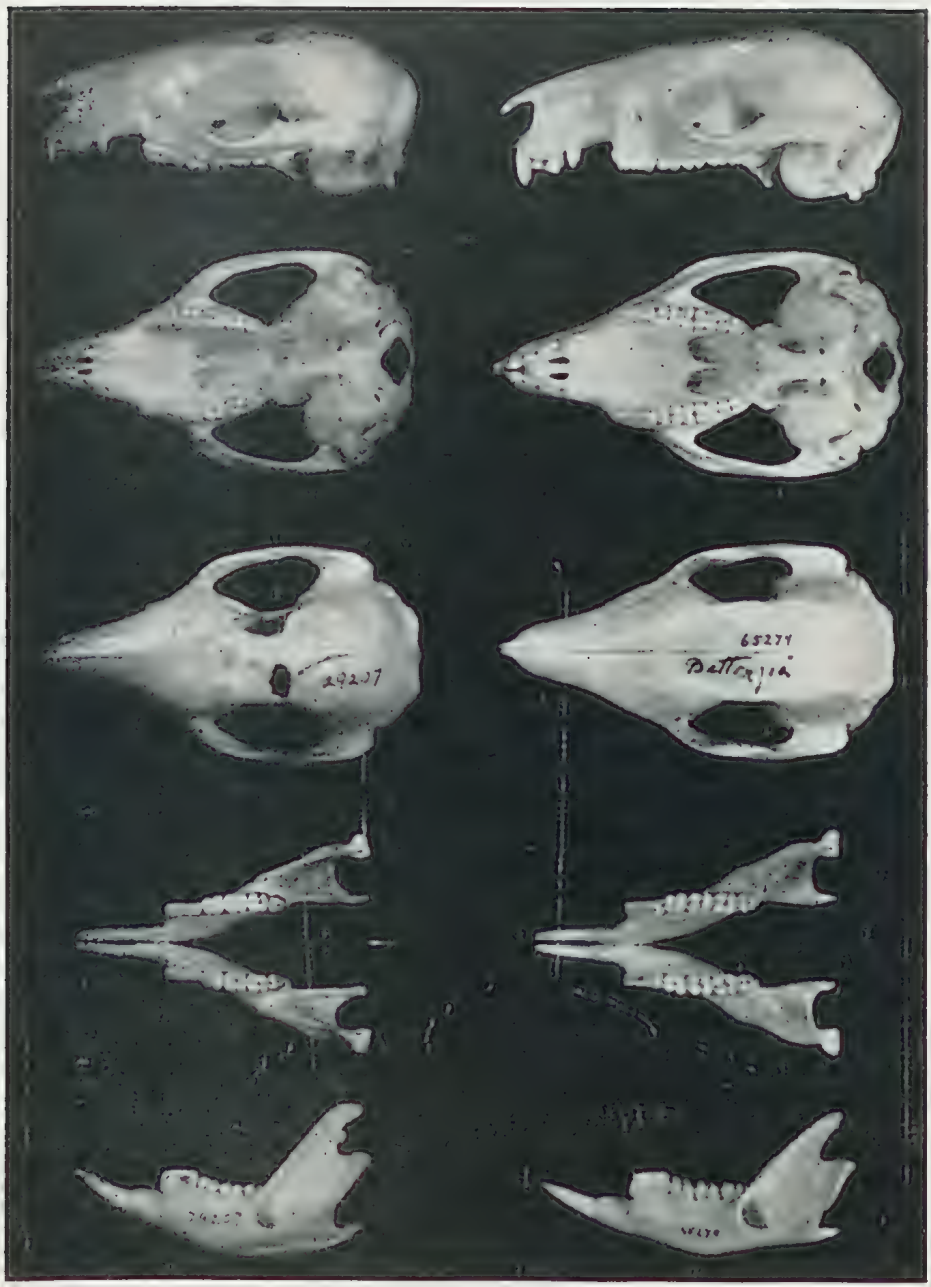
Cranial proportions of species of *Bettongia* (percentages of Basal Length). In each case the upper figures give the Range and the lower figure, in parenthesis, is the Mean.

	B. gaimardi gaimardi 7 specimens	*B. gaimardi cuniculus* 11 specimens	*B. gaimardi*: Data of two races combined 18 specimens	*B. penicillata ogilbyi* 14 specimens	*B. tropica* 4 specimens
Zygomatic Width	63.8-68.4	61.4-65.1	61.4-68.4	60.0-67.2	63.3-65.2
B.L.	(66.9)	(63.9)	(64.8)	(63.4)	(64.1)
Interorbital Width	27.4-31.5	26.2-30.1	26.2-31.5	23.7-28.6	20.9-28.3
B.L.	(28.8)	(28.7)	(28.7)	(26.2)	(24.6)
Nasals Length	47.0-48.9	47.5-50.6	47.0-50.6	45.8-52.6	43.1-51.1
B.L.	(47.9)	(48.9)	(48.5)	(48.4)	(46.3)
Nasals, Greatest Width	18.4-24.9	17.4-23.1	17.4-24.9	17.9-22.8	20.2-22.5
B.L.	(21.9)	(22.6)	(22.3)	(20.9)	(21.1)
Rostrum Width	21.6-25.2	22.7-25.9	21.6-25.9	22.4-25.4	21.1-23.4
B.L.	(23.8)	(24.6)	(24.3)	(23.9)	(22.3)
Nasal Opening Width	12.4-15.0	12.1-14.4	12.1-15.0	10.7-14.0	11.4-13.0
B.L.	(13.6)	(12.9)	(13.2)	(11.9)	(12.1)
Bulla Length	17.8-19.7	17.0-18.7	17.0-19.7	20.3-21.9	21.1-21.7
B.L.	(18.7)	(17.7)	(18.2)	(21.3)	(21.5)
Bulla Depth	13.2-15.6	12.5-14.8	12.5-15.6	14.3-17.2	16.7-17.3
B.L.	(14.2)	(13.5)	(13.8)	(16.1)	(17.0)
P^1–P^4 Width	28.9-32.2	28.7-31.8	28.7-32.2	31.1-36.1	29.6-32.9
B.L.	(30.7)	(30.7)	(30.7)	(32.3)	(31.2)
M^1–M^4 Width	27.7-31.3	27.1-30.3	27.1-31.3	24.4-26.5	25.4-28.9
B.L.	(29.4)	(28.8)	(29.0)	(25.1)	(27.2)
P^4 Length	10.6-11.9	11.0-12.1	10.6-12.1	10.0-11.8	12.1-13.6
B.L.	(11.2)	(11.5)	(11.4)	(10.7)	(12.9)
M^{1-3} Length	18.1-20.9	18.4-20.7	18.1-20.9	17.0-19.6	19.2-20.9
B.L.	(19.8)	(19.2)	(19.5)	(18.4)	(20.5)
M^4 Length	4.6-5.6	4.5-6.3	4.5-6.3	3.4-4.2	4.1-4.7
B.L.	(5.1)	(5.4)	(5.3)	(3.9)	(4.4)

Cranial Details of *Bettongia gaimardi.*

Left side: Specimen of *B. gaimardi gaimardi* (Macleay Museum No. M1166).

Right side: Specimen of *B. gaimardi cuniculus* (AM No. S1683)



Cranial Details of *Bettongia tropica*.

Left side: Type specimen (NMV No. C6870). Right side: Specimen AMNH No. 65279.
[Figures in Plates 1, 2 and 3 are approximately two-thirds actual size.]

c. Other Specimens:

Darlington collected two other specimens, also at Mount Spurgeon, in July 1932:

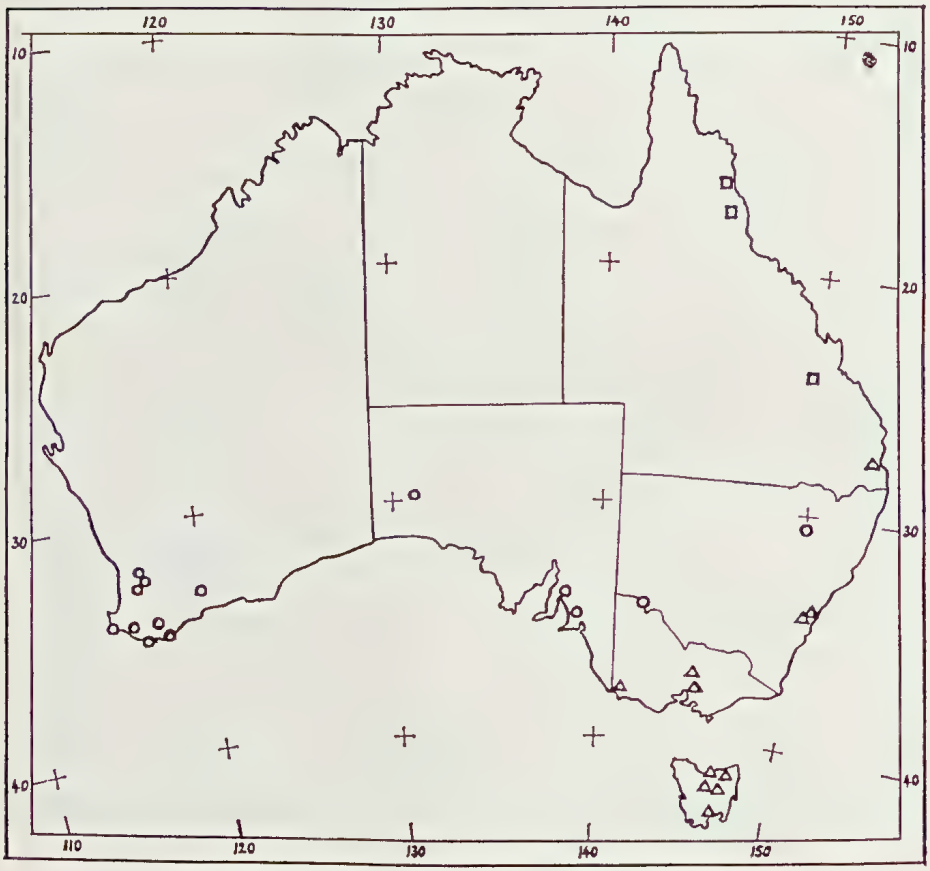
MCZ No. 29205, adult female, slightly more brown than type. Total Length 641, Tail 335, Pes 123, Ear 40. Claws of Manus 5, 9, 14·5, 13, 5. Claw of 4th Digit of Pes 14.

MCZ No. 29206, subadult male, general coloration much paler than in the two adults and tail with terminal tuft of silvery hair. Total Length 631, Tail 329, Pes 116, Ear 36. Claws of Manus 6, 10, 13·5, 13, 4.

In May 1922, H. C. Raven acquired two specimens from Vine Creek, Ravenshoe, north-eastern Queensland. AMNH Nos. 65279 (adult) and 65280 (subadult), but only skulls were preserved. (See Plate 3, right side.)

The sixth specimen, comprising a skin and skull, is located in the Zoological Museum of the Oslo University, Norway. Of it, E. K. Barth stated (*in litt.*, 25.11.1963), "On the tail it has a marked dorsal crest with maximum

TEXT-FIGURE 1



Localities of Specimens of *Bettongia*.

○ — *B. penicillata* △ — *B. gaimardi* □ — *B. tropica*

hair length 22 mm." and "the apical hairs of the tail are the same colour as the whole tail crest". The specimen was collected by Lumholtz in January 1884 at Coomooboolaroo, Dawson Valley, eastern Queensland.

The identification of the south-eastern Queensland specimen (AM No. 1121) as *B. gaimardi* and not *B. tropica* is based on the small size and the few grooves of the deciduous third premolar (p^3 Length 4·5, grooves 4 only). (See Section 4b.)

d. Cranial Characters:

In size and proportions, the skull is almost the same as that of *B. penicillata*, the Interorbital Width being less than in *B. gaimardi*. The rostrum is narrower than in either *B. gaimardi* or *B. penicillata*. The auditory bullae are proportionately much larger than those of *B. gaimardi*, slightly larger than those of *B. penicillata*, and not as large as those of *B. lesueur*. In disposition and size gradient, the molars are similar to those of *B. gaimardi* except that the fourth is smaller, and they are all proportionately larger than in *B. penicillata*.

As in *B. lesueur* and *B. gaimardi*, the permanent premolars (p_4, p^4) are long, and they are not flexed outward anteriorly. In proportion to skull size, the premolar length is less than that of *B. lesueur* and greater than that of *B. gaimardi*. The vertical grooves number 8-9, compared with 7-8 (or less) in *B. gaimardi*.

In the two subadult specimens of *B. tropica*, the deciduous third premolar (p^3) has 6 grooves, as compared with 5 (rarely 4) in *B. gaimardi*. The length of p^3 in both these specimens of *B. tropica* is 5·5, compared with averages of 4·8 and 5·3 for *B. gaimardi gaimardi* and *B. g. cuniculus* respectively.

Data of measurements of cranial and dental characters of *B. tropica* are set out in Table 1 and proportions are set out in Table 2. The data are of 4 specimens: NMV No. C6870, MCZ No. 29205, AMNH No. 65279, and the Oslo skull.

In comparisons between *B. tropica* and *B. penicillata*, the following orders of statistical significance were found:

For Rostrum Width/Basal Length, $p<0.05$
For Bulla Depth/B.L., $p<0{\cdot}05$
For m^{1-3} Length/B.L., $p<0{\cdot}002$
For m^4 Length/B.L., $p<0{\cdot}02$

Despite the similarities, in cranial proportions and in molar gradient, between *B. tropica* and *B. penicillata*, the shape and insertion of the premolars suggest that the relationship between these two is not as close as between *B. tropica* and *B. gaimardi*. (See footnote, Section 3.)

In comparisons between *B. tropica* and *B. gaimardi*, these orders of significance were found:

For Rostrum Width/B.L., $p<0{\cdot}02$
For Interorbital Width/B.L., $p<0{\cdot}02$
For m^4 Length/B.L., $p<0{\cdot}02$
For p^4 Length/B.L., $p<0{\cdot}002$
For Bulla Length/B.L., $p<0{\cdot}002$
For Bulla Depth/B.L., $p<0{\cdot}002$

References

Brazenor, C. W. (1950). *The Mammals of Victoria*. National Museum of Victoria, Melbourne.

Collett, R. (1887). On a collection of mammals from central and northern Queensland. *Zool. Jahrb.*, **2**: 829-940.

Desmarest (1822). Mammalogie ou description des espèces de mammifères. *Tabl. Encyc. Meth., Mamm. Suppl. ii*, p. 542.

Finlayson, H. H. (1931). On the mammals from the Dawson Valley, Queensland. Part 1. *Trans. Roy. Soc. S. Aust.*, **55**: 67-89.

Finlayson, H. H. (1957). Preliminary description of two forms of *Bettongia* (Marsupialia). *Ann. Mag. Nat. Hist.* (*12*), **10**: 552-554.

Finlayson, H. H. (1958). On Central Australian mammals (with notice of

related species from adjacent tracts) Part 3—the Potoroinae. *Rec. S. Aust. Mus.* **13** (**2**): 235-302.
Finlayson, H. H. (1959). Subfossil Potoroinae (Marsupialia) from South Australia. *Trans. Roy. Soc. S. Aust.* **82**: 291-300.
Gaimard (1824). *Bull. Sci. Nat. i*, p. 271 (Quoted from Thomas, 1888.)
Gray, J. E. (1837). *Mag. Nat. Hist. (Charlesworth) Vol.* **1**, p. 584 (Quoted from Iredale & Troughton, 1934).
Iredale, T., & Troughton, E. LeG. (1934). A checklist of the mammals recorded from Australia. *Mem. Aust. Mus., No.* **6**, pp. 1-120.
Krefft, Gerard (1866). On the vertebrated animals of the lower Murray and Darling, their habits, economy, and geographical distribution. *Trans. Phil. Soc. N.S.W., 1862-65*: 1-33.
Marlow, B. J. (1958). A survey of the marsupials of New South Wales. *C.S.I.R.O. Wildlife Research* **3**(**2**): 71-114.
Ogilby, W. (1838). *Proc. Zool. Soc. (Lond.), 1838*: 63.
Quoy & Gaimard (1824). Zoologie, in Freycinet: *Voyage autour du monde, Uranie et Physicienne*, 1817-20.
Siegel, S. (1956). *Nonparametric statistics for the behavioural sciences.* McGraw-Hill, New York.
Tate, G. H. H. (1948). Studies on the anatomy and phylogeny of the Macropodidae. *Bull. Amer. Nat. Hist.*, **91**: 233-252.
Troughton, Ellis (1941). *Furred Animals of Australia.* Angus & Robertson, Sydney.
Thomas, Oldfield (1888). *Catalogue of the Marsupialia and Monotremata in the collections of the British Museum (Natural History).* British Museum, London.
Wakefield, N. A. (1960). Recent mammal bones in the Buchan district—1. *Vict. Nat.*, **77** (**6**): 164-178.
Wakefield, N. A. (1963a). Sub-fossils from Mount Hamilton, Victoria. *Vict. Nat.* **79** (**11**): 323-330.
Wakefield, N. A. (1963b). Mammal subfossils from near Portland, Victoria. *Vict. Nat.* **80** (**2**): 39-45.
Wakefield, N. A. (1963c). Mammal remains from the Grampians, Victoria. *Vict. Nat.* **80** (**5**): 130-133.
Wakefield, N. A. (1966). Mammals recorded for the Mallee, Victoria. *Proc. Roy. Soc. Vict.*, **79** (**2**): 627-636.
Waterhouse, G. (1841). *Marsupialia, or pouched animals.* In Jardine, William (ed.), The naturalist's library.
Waterhouse, G. (1846). *Natural history of the Mammalia, Vol. 1. Marsupiatia, or pouched animals.* London.

Abstract

A study has been made of the species of the genus *Bettongia*, which comprises *B. lesueur*, a burrowing, woolly-haired species, and *B. penicillata*, *B. gaimardi* and *B. tropica*, which three are nest-building, brush-tailed species.

B. penicillata, distinguished by the unique morphology of its premolars, is shown to have had a more restricted distribution than that attributed to it in current literature, and the validity of the present subspecific classification in the species is questioned.

B. gaimardi is shown to have had a mainland Australian distribution from south-eastern Queensland to south-western Victoria. The larger Tasmanian form, currently known as *B. cuniculus*, is considered to be conspecific with *B. gaimardi*, and is reclassified as *B. gaimardi cuniculus*.

A hitherto unrecognized species of brush-tailed bettong, native in north-eastern Queensland, is described and named *Bettongia tropica*. From *B. gaimardi*, *B. tropica* is distinguished mainly by the larger premolars and larger auditory bullae.

Acknowledgements

I wish to acknowledge the assistance given by the Directors and staff members of the museums and other institutions, in Australia and overseas, from which specimens have been available for examination and data gathered. The cost of illustrations in this paper has been met by the M. A. Ingram Trust.

Field Naturalists Club of Victoria

General Meeting—12 December 1966

An almost capacity audience attended the Herbarium for the final meeting of 1966.

The President, Mr. M. K. Houghton, opened the proceedings, and expressed the feeling of the members by welcoming back Mr. Woolard after his illness.

The Secretary, Mr. H. Coghill, referred to correspondence covering the appeal for the Tower Hill Natural History Museum and the proposed regeneration of the area. He also mentioned the coming AANZAS conference to be held at Melbourne in January next.

Mr. Houghton introduced the guest speaker, Miss Ina Watson, who will be retiring from the position of Information Officer with the Fisheries and Wildlife Department, in January.

Her lecture was entitled, "A Look in a Mirror". The "mirror" reflected three most important phases of her life as a naturalist.

These were the associations she had with a great ornithologist of the past, Mr. A. G. Campbell; a dour Scot, but a great inspiration to her, Philip Crosbie Morrison, who has been unsurpassed in the art of conveying scientific information in everyday terms— and the staff of the Fisheries and Wildlife Department, with whom she has shared some memorable experiences. Not the least among these was the handling of, and the seeing of, the two little animals which had been thought extinct; namely Leadbeater's Possum and Burramys.

Her lecture finished with a delightful combination of colour slides and commentary, which took us on a day-trip, commencing at dawn, into the nearer countryside during the month of October. Everything, from the sunlit dew-drenched grasses, to hosts of birds and their young, to insects and plants, and on to the creatures of the night; was covered in an enchanting manner, together with superb camera technique.

It was, altogether, a most enjoyable evening. This was emphasized by the applause from members.

Under General Business, two motions were moved and seconded, and carried. These were—

1. That the R.A.C. be congratulated on the article covering the proposed Glenelg National Park, published in their magazine for December 1966, and—

2. That the owners of the King Ranch near Tully in Queensland, be asked whether it is in fact true, as reported to the meeting by Mr. J. Baines, that the lush rain forests of the area are being destroyed by bulldozer; and if this is so, that efforts be made to control this. Mr. Baines pointed out that this type of rain-soaked jungle was the haunt of the Cassowary.

Mr. Morrison exhibited and spoke about the method he uses to set insects in polyester resin. He showed examples of a dragonfly, scorpion, and a beetle.

New members, whose names appear in the December *Naturalist*, were elected.

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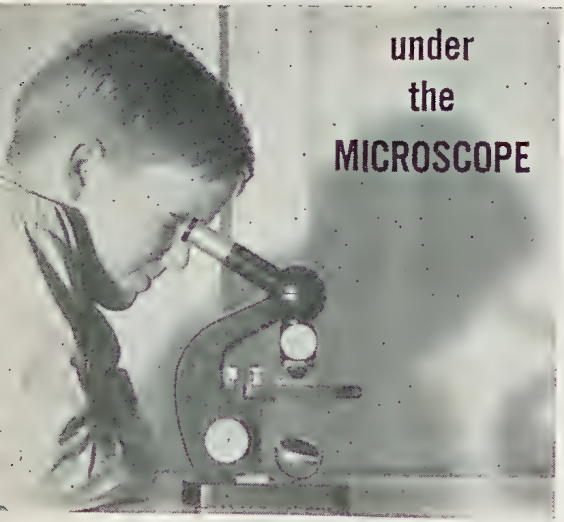


No. 6

VOLVOX

By E. LeMaistre

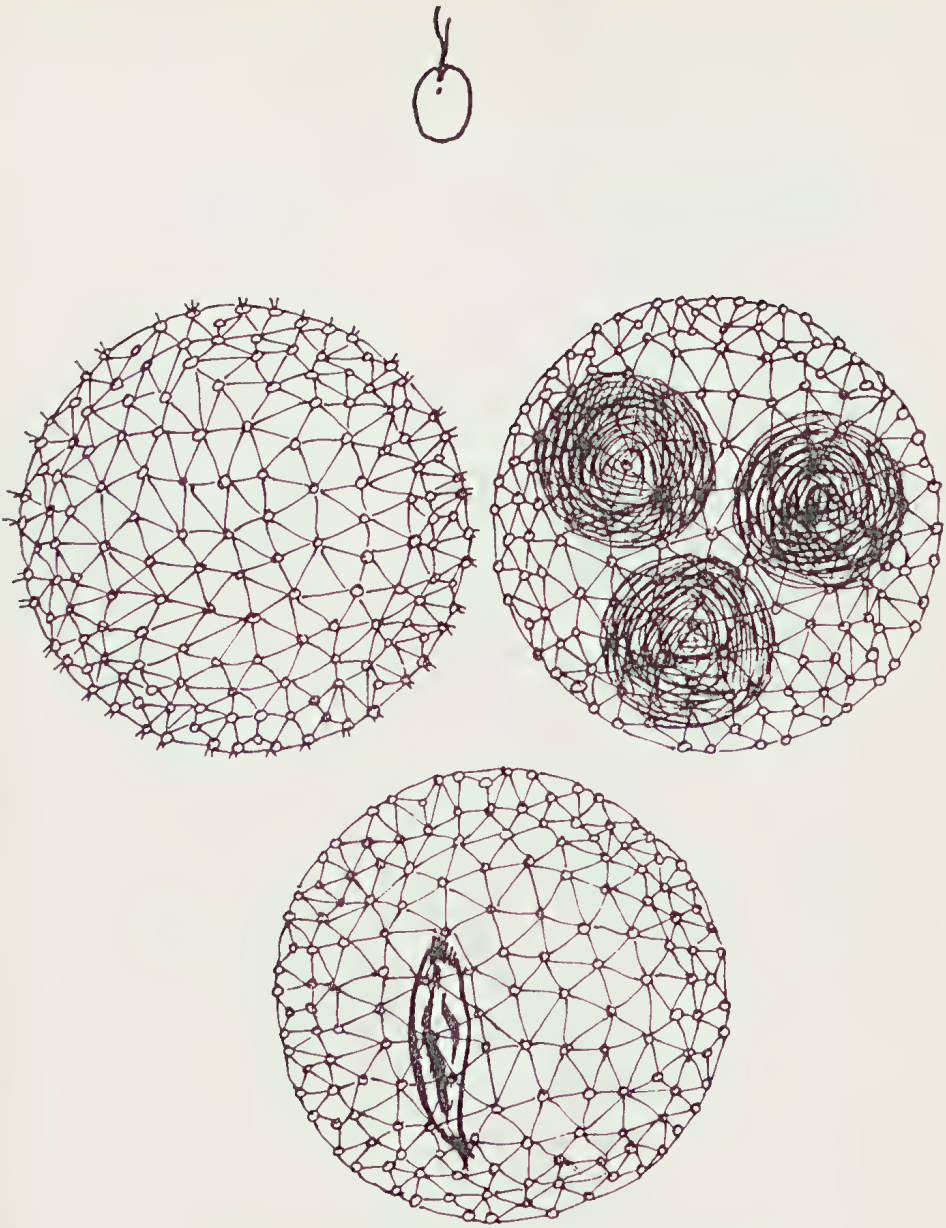
In a previous article we discussed Euglena, a flagellate Protozoan which seemed to be both animal and vegetable; however, fresh water ponds also provide us with a number of types of green unicellular plants, living by photosynthesis alone: but each with one or two whip-like flagella which enable the organism to move through the water, rather than remaining in one place as one would expect from a plant.

These Flagellates are very small, in the region of 1/40th of a millimetre, and are only visible as small green dots unless a high magnification is used (see illustration—Chlamydomonas), but some form into colonies and it is one of these, *Volvox,* which is the subject of this article.

If you can imagine a transparent tennis ball, its surface studded with small brilliantly green emeralds, slowly rotating through the water, you then have a thought picture of *Volvox globator.* In actual fact it is a colony of some hundreds of individual plant flagellates, each joined to the other with thread like "lines of communication", and the action of the flagella cause the spherical colony to revolve.

One of the amazing things about *Volvox* is that new colonies commence forming inside a mature colony, and as they grow larger, eventually rupture the wall of the mother colony which then dies; and the daughter cells grow into mature forms, thus completing the cycle. When *Volvox* are plentiful, it is quite common to find numerous colonies each housing one or more daughter colonies. On rare occasions one special type of Rotifer may be found inside a mature colony, living there without damaging the *Volvox,* and apparently obtaining sufficient nourishment without having to prey on its colonial environment.

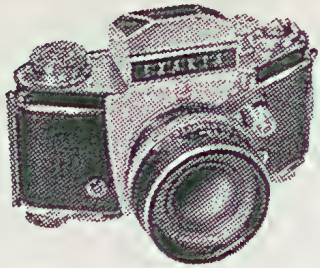
The F.N.C.V. microscope is quite adequate for viewing *Volvox,* and once again the most attractive results will be obtained with dark ground illumination, or its near equivalent.



Extreme Top—Chlamydomonas. Approx. size $^{1}/_{1000}$ inch.

Left—*Volvox globator,* approx. diam. $^{1}/_{22}$ inch. Right—*Volvox globator* with daughter cells.

Lower—*Volvox globator* with enclosed Rotifer.



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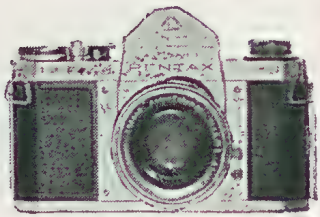

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F.N.C.V. DIARY OF COMING EVENTS

GENERAL MEETINGS

Monday, 9 January—At National Herbarium, The Domain, South Yarra; commencing at 8 p.m.

1. Minutes, Reports, Announcements.
2. Correspondence.
3. Subject for the evening: Members' Night—"Queensland".
4. Election of New Members.

Monday, 13 February—"West of Alice"; Messrs. J. H. Willis and A. Morrison.

4. General Business.
5. Nature Note and Exhibits.

GROUP MEETINGS

(8 p.m. at National Herbarium unless otherwise stated)

Wednesday, 18 January—Microscopical Group.

Friday, 27 January—Hawthorn Junior Club; at Hawthorn Town Hall at 8.00 p.m.—Members' Night.

Wednesday, 1 February—Geology Group.

Thursday, 2 February—Mammal Survey Group; at Fisheries and Wildlife Dept. Library at 7.45 p.m.

Friday, 3 February—Preston Juniors Meeting at 251 High Street, Preston, in Rechabite Hall, at 8 p.m.

Thursday, 9 February—Botany Group Meeting.

Botany and Geology Groups do not meet in January;

Entomology and Marine Biology—(see December *Naturalist* 1966).

F.N.C.V. EXCURSIONS

Sunday, 15 January—To Marysville area. Bus leaves Batman Ave., 9.00 a.m. Bring two meals.

Field Naturalists Club of Victoria

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OBJECTS: To stimulate interest in natural history and to preserve and protect Australian fauna and flora.

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Fauna Survey: Mrs. R. Frankenberg, 14A Glassford Street, Armadale, S.E.3.

Entomology and Marine Biology: Mr. J. W. H. Strong, Legislative Council, Parliament House, Melbourne, C.2.

MEMBERSHIP

Membership of the F.N.C.V. is open to any person interested in natural history. The *Victorian Naturalist* is distributed free to all members, the club's reference and lending library is available, and other activities are indicated in reports set out in the several preceding pages of this magazine.

Rates for January-December 1967 are:

Ordinary Membership	$5.00
Country Membership (over 20 miles from G.P.O., Melbourne)	$4.00
Junior Membership (under 18 years)	$2.50
Subscription to the *Victorian Naturalist* (non-members)	$4.00

Note: The currency of the present club year and Volume 84 of the *Victorian Naturalist* is from January to December, 1967.

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the VICTORIAN NATURALIST

Vol. 84, No. 2 FEBRUARY, 1967

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Vol. 84, No. 2

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Front Cover:

Graham Pizzey took this action photograph of a flock of Cape Barren Geese; once plentiful in Southern Victoria; but now, due to past sins, rare.

Editorial

It was heartening that such prompt action last month, on the part of the Chief Secretary, resulted in an evaluation of the fire-fighting equipment and techniques at Phillip Island, in the area of the penguin and mutton-bird rookeries.

However, it is only through sheer good luck that the burnt area and loss of bird-life was minimal. We have in the past, and still seem to be, "shutting the stable door too late," in regard to much of our conservation program.

Might it not therefore, be an opportune time to take stock and examine the position with respect to fire-fighting techniques, within all our reserves which protect both fauna and flora?

At Phillip Island, the fact that fire-fighting equipment had to be brought from Cowes, a distance of about ten miles, appears to leave something to be desired. Similar situations may very likely exist in a number of areas, and if this is so, surely it seems reasonable to provide a store of simple, modern equipment at one or more strategic positions within the reserve, which can be used to contain any similar outbreak of fire within reasonable limits until larger and more efficient equipment arrives. The cost involved would be small when compared with the loss of fauna and flora which may occur.

At the same time, whilst on this subject, it was a little disturbing to read the Chief Secretary's final comment that we must save this rookery because of its great tourist attraction. Surely the rookery should be protected primarily for the sake of the birds themselves. It is to be hoped that commercialized tourism appears low on the list of reasons governing our conservation plans; and if this is so, then let us keep tourists *en masse* apart, until the security and welfare of our wildlife has been placed beyond doubt.

The F.N.C.V. Treasurer

No doubt, members were well aware of the problems confronting Council during the last twelve months, when it became evident that both a new Treasurer and Assistant would have to be found before the beginning of 1967. Mr. Hooke and Miss Butchart had been desirous of being relieved of their positions for some time.

Further anxiety was caused, due to the fact that in September, formal resignations had been received from both Mr. Hooke and Miss Butchart, and even at this stage, no response to the numerous appeals had been forthcoming.

Then, in December last, Mr. N. M. Taylor, of Toorak, came forward and offered himself for the position of Honorary Treasurer, provided that he would be able to obtain professional part-time assistance.

The amount of work involved in this position, in such a large organization as the F.N.C.V., is very considerable. This is especially the case when the Treasurer is already employed full time elsewhere; and the Council had been aware for some time, of the possibility that it may become necessary to obtain professional part-time help for the Treasurer.

Therefore, at a special meeting of the Council, held on the 12th January, 1967, Mr. N. M. Taylor was duly elected as Honorary Treasurer of the F.N.C.V., and was also authorized to make necessary arrangements for professional assistance.

This will of course, incur extra annual expense to the Club, but the services obtained will be well worth this expense; and will relieve the new Treasurer of the heavy burden, which Mr. Hooke and Miss Butchart have borne for so long.

Mr. R. L. Smith is to be the Club's Accountant, and in future, subscriptions may be sent to his office, at 430 Little Collins Street, Melbourne, C.1. Phone: 67 3131.

Contrast in Seals

By John Béchervaise

Heard Island, September 25:

I hauled out unwillingly at seven, half fearing, as I heard the sleet belting against the station, that I might lack company on my visit to South West Bay. But Arthur, of course, would never have been deterred by weather. He came into the Mess soon after I was seated.

"Seasonable!" was his wry comment. "Can you improve the morning, Dick?"

Considerably strengthened by Dick McNair's breakfast, we departed wearing 'submarine suits', about half-an-hour behind Jim, who would join us after he had changed the magnetic traces. Granular snow soon degenerated into miserable sleety rain.

We slithered and crunched across to South West Bay, intercepting Jim's tracks on the white plain we call 'Windy City'. Beyond, it was an utterly desolate beach we found, strewn with thousands of ice fragments ranging in size from small boulders, to chunks of one or two hundred cubic feet. The recent hurricane had dashed the ice from the glacier fronts well over a hundred yards inland from the sea.

Gravity spreading their vast bulk of blubber over several square yards, the old elephant bulls lay sprawled amidst the ice. I believe that the largest, fourteen or fifteen feet long, might have weighed three and a half tons. In two places, harems of forty or fifty cows had formed; already a couple of large and venerable bulls appeared to hold domiciliary rights. They lay on the beach watchfully, but did not appear very interested in the herds they marshalled[1]. Bull elephant seals are almost incredible. They remind me of that odd nosey caricature of officialdom known as 'Chad' who, always blinking over a wall, was once chalked up all over London. Their enormous distended noses drop down a foot or more from their red, lecherous eyes. Immense shapeless bags of flesh, they mostly lie as though exhausted; but every now and then they will rear up ponderously, inflating their probosces[2] and bellowing challenges to the wind and spray. A bull that has engaged a harem, however, will defend it vigorously against all comers, using his sheer mass as his principal weapon.

At present, while the population of pups is daily increasing, the cows are still left more or less in peace. Generally the old breeders are prone on the outskirts of the colony unless an intruding male is being hunted smartly back into the breakers. Occasionally the rivals confront each other, rearing so high that one wonders how they are supported. Then, rhythmically and stubbornly, they thud away, using their massive bodies as clubs, and trying, generally ineffectually, to rip each other with their tusky teeth . . . until the vanquished retires.

In tranquillity, these mountainous animals have a curious and comical habit of scratching themselves with one of their flippers. This dexterity seems extraordinarily out of keeping with their flaccid bodies. The flipper

is raised, arched, extended, an amazingly articulated organ, moving with the graceful gestures of a ballet dancer, ludicrously like a human hand. Often it is the only sign of life, appearing unexpectedly, hopelessly inadequate, one would think, for attending so huge an area of blubber.

The cows are a great deal smaller than the bulls, often between six and eight feet long. Many are now accompanied by their pups—wideawake shivering little elephants covered with long, moist, black hair. The pups are mostly about three and a half feet long at birth, quite beautiful by comparison with their parents, possessing disciplined form and bright bulbous little eyes. Arthur suggests their average weight at birth is close to eighty pounds. They nuzzle their tired, immobile mothers. The contrast in temperature for a pup, before and after birth, must often be seventy or eighty degrees (Fah.). They appear to feel the cold, but are quite energetic, raising their heads almost as soon as they are born in rather plaintive little yelping barks, somewhat reminiscent of those of canine puppies. They even look like huge prone water-spaniels.

Arthur is much more objectively observant than any of us. He records all details of brands—from previous years—and is already preparing for the branding and weighing operation of the current season. Doubtless this work will be of great biological value, and we are all looking forward to assisting in any way we can. I sometimes wonder whether instruments will have to be invented to register the relative brightness of animals' eyes, the dampness of their noses, the crimp of their hair, the cadence of their voices—all the present immeasurables and imponderables—before they become of scientific interest.

When we arrived at the forlorn beach, it was blowing a gale of rain. The breakers towered up and fell suddenly on the steeply sloping black sand. James was on ahead, looking for the Ross Seal which had been reported yesterday, but it seemed certain that the rare and unexpected visitor had departed. Just as we came level with Jim, we saw something arching its way into the surf. It was too small for any elephant likely to be entering the water. It was the Ross Seal![3]

ANARE Photo: *John Béchervaise*

The head of a Ross Seal, with nostrils distended. This animal can close its nostrils completely, as shown in other photographs.

James dashed down into the water regardless of the spray and oncoming waves, and managed to turn it back up the beach before it slithered away and completed perhaps the only visit of its kind to a sub-antarctic island. Arthur and I joined him at the edge of the icy surf, while the little beast, no more than five feet long, puffed his throat and bared his sharp, beautifully white teeth. In the scurrying, icy rain, we set about photographing him from all angles, fearing that he would suddenly elude us. But, after a while, it seemed that he had no real intention of leaving.

The Ross Seal has an extraordinary frog-like mouth, closing like a trap. When he closes them, his nostrils also become invisible except as lines. He is sleek and grey, handsomely striped from the lower jaw to the flippers, and dappled white and grey on the underside. From some angles he reminded me, perhaps not unnaturally, of a podargus. His double hind-flipper tail was like that of the Leopards, but his fore-flippers were more angular, stretched, with long webbed 'fingers'. When he moved over the sand, he left a trail as distinctive as a turtle's, a clear double row of impressions about five or six inches apart.

The movements of the Ross Seal do resemble those of the other true or earless seals—the Phocidae—but I have never seen so regular a pattern of flipper movements, recorded in sand or snow, from either the elephant or the leopard seals. However, these progress by similar convulsive body movements, using the flippers for necessary friction. The Otariidae, or Eared-seals, such as those common along the Australian coast, make more positive use of their flippers to aid progression on land, and their rear flippers, instead of trailing as a 'tail', may be actively used for locomotion.

The rarest of the world's seals will remain a distinctive memory. I could recall no pictures showing anything like the detail that we saw: I only hope our photographs will describe him adequately. It would be interesting to know just how many of these solitary seals have been observed.[4]

James returned to the station. Arthur and I walked on to the end of the beach to count the Gentoos, and to look at the growing elephant harems and the newly born pups. It was a strangely thrilling world's-end walk, though it was cold, wet, grey, and forlorn. Man must always be a stranger in this environment where seals and birds thrive amongst the translucent ice.

Arthur recovered the skull of an elephant, killed only yesterday by Leon, but already almost denuded of flesh by the skuas. We swung the relic on a hook all the way round the end of Mount Drygalski and back to camp, arriving streaming with water just as Dick was serving morning tea.

The day on the station passed largely in routine; it was not conducive to out-of-doors work. The persistent rain soon filled the tanks and removed the necessity for snow-melting. Everyone 'went to earth' and worked in his section. I found Arthur very busy in the afternoon . . . darning his socks. Jack and Leon found time to squelch over to South West Bay in the afternoon and reported, on their return, that the Ross Seal was still there.

I have been writing since I finished an after-dinner game of chess with Peter, and it is now eleven o'clock. These sixteen- or seventeen-hour days all seem too short. Now it is freezing again. Jim has been working down here in the Biology Hut tonight, where he, Arthur and I spend much of our time. He has been trying to find the reasons for some changes in the 'H' (horizontal) base-line of his magnetograms. Only a hundred yards or so away, down near the Hydrogen Hut, a bull elephant seal is grunting away and trying to marshall a couple of unenthusiastic cows into a miniature harem. All age-old repetition . . . late September, and the same instinctive behaviour patterns century after century, even now only slightly interrupted by man's presence on the island. It will continue long after he has left.[5] A good and memorable day, with *Ommatophoca Rossi* of the pack-ice well to the fore. Perhaps he really mistook Heard Island for Antarctica

ANARE Photo: *John Béchervaise*

General view of the Ross Seal *Ommatophoca rossi.*

proper; in climate it has been close enough these last weeks.

With man, motives rather than actions are steeped in instinct.

Sunday, September 27:

There was no sign of life about the station when I left for West Bay this morning, shortly after seven. An exceptionally low tide allowed me to walk at the water's edge almost all the way round to a point level with the Magnetic Station. A delightful progress, just about six feet below the level of the plain on whose snowy edge lay two or three elephant hulks with attendant cows, but no pups as yet. There were no leopards, but the shags had returned in force, and seemed tamer. It was possible to approach them closely enough to see their beautiful blue-ringed eyes. There were plenty of Nellies and Dominicans wheeling about; more than usual because of the seal carcases which Leon dumped yesterday.

One of the most striking sights was the continuous flow of sparkling water from beneath the ice-sheet of the Nullarbor. The night's frost had not been sufficient to re-freeze the plain to any depth. The pleasant, mild morning really seemed to herald approaching Spring . . . with inevitable thoughts of an attempt on Big Ben.[6]

Even inside the Mess, later, one could hear the animal sounds of the peaceful afternoon: not only of the dogs, but from bulls down on the point, the most sustained grunts and belches of the whole animal kingdom. Sometimes even the curious fog-horn of a leopard was audible, but leopards are rare at this time of the year. In September, particularly, when the sea yields up its monsters, we humans seem intruders on the island, entering into something very ancient, primitive, and simple; too powerful for our presence greatly to disturb. All day—and night—now, the voice of the elephant is heard in the land.

Wednesday, September 30:

At breakfast time, Jim, flushed from his dank walk to West Bay, reported the state of the elephant harems in that quadrant. "Fifty-seven cows, sixteen pups, two bulls . . . the first bull seems to be willing to divide his mob, but the second doesn't seem to want to come in! At the far end of the Cove there are ten cows and no pups. The '40' brand is still there. The beach harem has twenty cows, five pups, and just one bull."

Arthur notes down the information on his cigarette box. "No leopards, I suppose?"

"No leopards."

Day by day, now, Arthur is endeavouring to keep a census of the elephant-seals. Last year, Les Gibbney, who did not combine the medical role, was able to be very thorough; his main responsibility was biology, and his chief interest was seals.

Another day got underway. Peter went forth to 'hoist balloons in the middle-air', and one thought of Glendower in Henry IV, 'calling spirits from the vasty deep.' Day after day from the inexpressible cloud-screened loneliness, far out over the sea and tens of thousands of feet high in the icy sunshine, the meteorological balloons carry their little transmitters. The balloons swell larger and larger. Finally, in the rarified stratosphere, they burst, and, falling like shot birds, reach the ocean or some drifting floe, a mere minute or two later. Back in the Meteorological Office, the long automatic trace has come to a sudden end as the red-inked pen shudders and refuses to trace the dizzy drop of the instruments, perhaps a hundred miles away.

ANARE Photo: *John Béchervaise*

The "turtle-tracks" of the Ross Seal, showing clearly how only the fore-flippers are used in locomotion.

ANARE Photo: *John Béchervaise*

The characteristic striated throat of the Ross Seal, the rarest of the Pinnipedia.

Thursday, October 1:

Evidently, news of our Ross Seal has reached the press and radio, and even been received in Macquarie Island, almost a quadrant away in longitude. Sturrock, the biologist there, today sent Arthur the following telegram:

"Seen pink seal with purple spots near Surgery Sunday morning—stop—Query identification."

To which Arthur in due course, incorparating various suggestions replied:

"Sturrock Macquarie Island—stop —Obviously *phosterphoca lageri*—stop—Did it have brand—query—Suggest you change yours—Gwynn."

General Note.—This extract from *Log for Lorna,* an illustrated diary addressed to the author's wife, follows on from that published in the February issue, 1965 (Vol. 81, No. 10). The author has just returned from a year's absence abroad which included a visit to the South Pole, and to all the U.S. Stations in Antarctica, as Official Observer for Australia to Operation *Deep Freeze,* 1966.

[1] The elephant seal cows usually finish weaning their pups before copulation takes place.

[2] The 'inflation' of the proboscis is characteristic of the breeding bulls.

[3] The Ross Seal, or Ross's Seal, is *Ommatophoca Rossi,* presumably named for Sir James Clark Ross, Commander of the *Erebus* and the *Terror,* and discoverer of the Ross Ice Shelf in 1840.

There are many isolated references to the Ross Seal in antarctic literature. Shackleton describes an early encounter on March 4, 1909: ". . . another party went out to the seal rookery to see if they could find a peculiar seal that we had noticed on the way to the hut on the previous night. The seal was either a new species or the female of the Ross seal. It was a small animal, about four feet six inches long, with a broad white band from its throat right down to its tail on the underside." (*Heart of the Antarctic*).

[4] During voyages through the pack-ice in 1955, '56, '59 and '60, the author observed no more than four or five Ross Seals, all solitary.

[5] Heard Island ceased to be an A.N.A.R.E. Station early in 1955.

[6] The summit of Big Ben was not reached until twelve years later, when an expedition led by Major W. Deacock was successful.

Reproduction in the Pheasant Shell, *Phasianella australis* (Gmelin, 1788)

(GASTROPODA : TURBINIDAE)

By Florence V. Murray*

Introduction

Commonly known as the "Pheasant Shell" or "Painted Lady", this turbinid is one of the most colourful molluscs found in southern Australian waters, and reaching up to five inches in length, is the largest species within the genus. The polished, porcellaneous shell, with its rich and variable colours and patterns, is a popular collector's item; the white, china-like, calcareous operculum fitting closely within the fragile lip, adds to its attraction. The animal is coloured to tone with the shell, and in life is active and spectacular.

The species ranges from Western Australia, east along the south coast, to Victoria and Tasmania, inhabiting bays and inlets where rocks and sand meet, and where there is a growth of the algae on which it feeds. Juveniles and young adults may be found in intertidal areas under algae-covered rocks and stones; large specimens are usually in deeper water on weed beds, particularly *Cympodacea australis*, where they may occur in vast numbers.

Since the turbinids are grouped in the Order Archaeogastropoda, the most primitive living gastropods, it could be expected that their mode of reproduction would follow, in general, that of similar primitive species. The British Pheasant Shell, *Tricolia pullus* (L.), is recorded as shedding its eggs freely into the water (Lebour, 1937), but otherwise nothing appeared to be known about turbinid life histories (Anderson, 1960), and this suggested an investigation into the spawning habits of the Australian species *Phasianella australis*.

Phasianella australis (Gmelin, 1788)
Ventral view.

The Experiment

This was carried out in a 4-gallon aquarium fitted with a filter, a substratum of sand and stones, and a supply of "Sea Lettuce", *Ulva lactuca*. Three medium-sized specimens, 39, 48 and 60 mm in length, taken at Balnarring and Westernport, on the 17th November, 1963, were placed in the aquarium where they crawled up the walls and settled down at the water level.

* 13 Gaynor Court, Malvern, Victoria.

No further inspection was made until about 9.00 o'clock the following evening when, shortly after the light had been switched on, the largest specimen, still in the same position at the water level, drew back its body into the shell, and, still clinging to the glass with its foot, pushed forward convulsively and expelled a jet of cloudy material. This procedure was repeated several times during the next 30 minutes, making the water in the aquarium quite turbid. Presumably this was a male animal spawning. While a sample of the ejaculate was being collected with a syringe, a movement causing a slight splash, was made by one of the smaller specimens also still clinging to the glass at the water level. Perhaps this was a female responding to the stimulus of the male emission; therefore another syringe was quickly directed to draw off water surrounding the animal, and this was found to contain minute green-coloured eggs only 0·14 mm in diameter. The male ejaculate contained myriads of motile cells, or spermatozoa, with heads 0·003 mm and tails 0·048 mm long. The two samples were placed together in a petri dish where fertilization of the eggs took place, and almost immediately development began. Within 12 hours ciliated embryos were revolving in the egg envelopes, and after another 12 hours they hatched as brilliant-green, lively little primitive, free-swimming larvae known as trochophores.

Phasianella australis (Gmelin, 1788)
Dorsal view.

Further studies are needed to gain information on the development of the trochophore into a shelled veliger; the behaviour of this larval form in the plankton; and the transition from its free-swimming life to that of its benthic, crawling parent.

Acknowledgements

I am indebted to Mr. J. E. Petersen of the C.S.I.R.O. Animal Health Laboratory for the micro-measurements, and to Mr. A. M. Rowlatt of the same Laboratory for the photographs.

References

Anderson, D. T., 1960. The life histories of marine prosobranch gastropods. *J. malac. Soc. Aust.* **4**: 16-29.

Lebour, M. V., 1937. The eggs and larvae of the British prosobranchs. *J. Mar. biol. Ass. U.K.*, **22**: 105-166.

Murray, F. V., 1964. The spawn of some Australian marine prosobranch molluscs. *Aust. nat. Hist.* **14**: 405-408.

Readers' Nature Notes and Queries

These columns are available for all members, young and old, to bring before others their own observations in nature. Correspondence may be sent to Mr. R. H. J. McQueen, 262 Nepean Street, Greensborough.

Bees and Nectar Glands

This interesting and accurate observation comes from Mr. W. Perry, of Eaglehawk, in Victoria.

Many years ago I read with interest the book, "Profitable Honey Plants of Australia", by Tarleton Rayment. The author referred to an observation he had made of bees gathering nectar from the phyllodes of Golden Wattle, *Acacia pycnantha*. He also discovered that nectar was not produced by the blossoms of this wattle, but only from the extra-floral nectaries situated on the edge of the phyllodes which are known to botanists as nectar glands. Mr. Rayment also noted nectar produced from glands on the phyllodes of Coast Wattle, *Acacia longifolia* var. *sophorae*.

The presence of one or several, or absence of nectar glands on the phyllodes of the Acacias is a guide frequently used in the identification of this genus. I have often examined nectar glands on many species of Acacia, but only observed nectar in any of them for the first time on the 7th August, this year.

On this day, I was admiring the lovely flowers on some small trees of Golden Wattle in our garden. A number of bees were hovering about, and although they neglected the flowers entirely, they constantly alighted on the phyllodes. They were taking nectar from the nectar glands. In some cases, nectar was smeared along the surfaces of the phyllodes where it had oozed out of the glands. I tasted some of this liquid which was quite sweet, and left no doubt in my mind that it was nectar. The bees gathering this nectar had no pollen in their "baskets" or corbiculae.

In a corner of the garden, a huge Cootamundra Wattle, *A. baileyana*, drooping heavily under the weight of its golden pendants, glowed in the sun. On this tree, hundreds of bees were busy gathering pollen. The noise of their continuous buzzing was almost deafening. No nectar was being gathered here, but in contrast to the bees on the Golden Wattles, the "baskets" of the insects on the Cootamundra were well filled with pollen.

Eastern Swamp Rat in the Grampians?

Mrs. E. Lyndon of Leongatha in Victoria brings forward this note.

During the second weekend in October we passed along the Victoria Valley on our way into the Grampians. Stops were fairly frequent along that picturesque valley road where the emus are as friendly as those at Wyperfeld. Groups of more exotic "fauna" in the shape of Tigers, Leopards and Golden Moths (*Diuris sulphurea, D. maculata* and *D. pedunculata*, respectively) could be seen in amongst other grassland flowers. At one place *Diurus longifolia*, the Wallflower Orchid, made a particularly attractive picture. There were dozens of tall and robust blooms packed into an area a few feet square. It was while walking back to these that we came on another item of interest. Among thick grass and debris at the foot of a gum tree there were the deep covered runways of native rats. Judging by the familiar heaps of soil thrown up, the length of the runs and the proximity of Mahoney's Swamp, the valley must be another haunt of the Eastern Swamp Rat.

Embedding Specimens in Clear Resin

By Ian F. Morrison

With a little care and patience, specimens can be embedded in a solidified block of clear resin.

The method as described hereunder is both simple and inexpensive. The main requirements are polyester resin and activator; styrene monomer (a thinner used to remove resin from tweezers, fingers, etc.); a release agent to line the moulds (moulds can be made from empty tins, glass jars, or small boxes lined with pieces cut from a plastic bag); a few sheets of wet and dry paper; and some metal polish.

The Procedure:

Insects, or other specimens are placed on a piece of cardboard and arranged as required for display. Secure with crossed pins to avoid damage, and place in a dish of methylated spirits and allow to soak overnight.

Remove and allow the specimen to dry in the air for an hour, then remove the pins.

Soak in unactivated resin for two or three days, holding down with a carefully placed small weight.

Prepare the mould by brushing a thin film of release agent over the internal surfaces, and allow to dry thoroughly.

To prepare a platform:

Mix a small amount of resin and activator (say one ounce of resin and eight drops of activator) thoroughly but gently, to avoid entrapped air. Stand for a few minutes and allow any bubbles to rise, then pour into mould and allow it to set. Pigment may be incorporated in the platform to show off the specimen if desired

Placing the specimen:

Remove specimen from unactivated resin, and place on blotting paper, allowing to drain for a few minutes; then remove most of the residue by moving it about on the blotting paper. Place the specimen in position on the prepared platform. For specimens that float, pour a thin layer of mixed resin on the surface before placing the specimen (not enough to float it) and let it set to secure sample. Pour sufficient mixed resin in, to fill the mould and submerge the specimen, and allow it to cure for two days. Best results are obtained if the resin block is "post cured" by placing in an oven at 140 deg. F. for three or four hours. A 60 watt light globe in a box, vented by two holes in the top will normally give sufficient heat. After this has been done, the block should come easily from the mould.

Polishing:

Wet both sides of a sheet of 180 grit "wet and dry" paper, and lay on a flat surface. Grind all faces of the block backwards and forwards, keeping the paper wet. Repeat this with 400 grit, and then 600 grit. Wash the block and dry it. Finally polish with metal polish using felt or soft cloth.

Prices are: Clear polyester resin (half pint $1), (one pint $1.76), one quart $3.24). Activator 5cc. (sufficient for one pint of resin) 15c. Styrene monomer 2oz., 30c. Release agent 4oz., 42c. Wet and dry paper can be purchased at any hardware store at 15c. per sheet. Materials may be obtained from some of the fibre-glass product manufacturers.

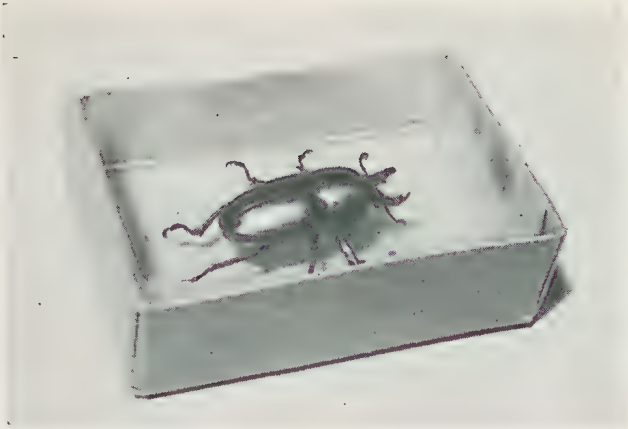


Fig. 1 shows cardboard box mould, with plastic sheet lining, and insect in position.

Photo: *Author*

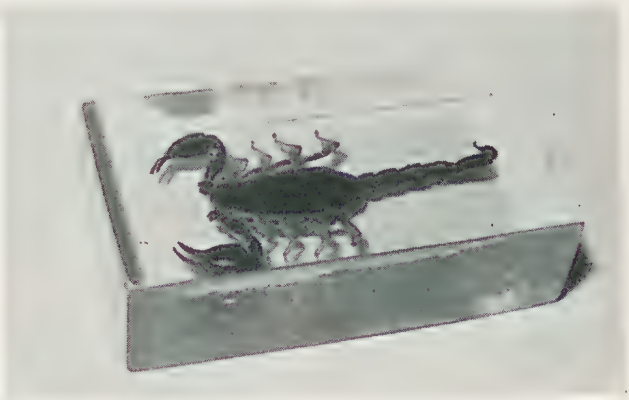


Fig. 2 shows specimen embedded in polyester resin block.

Photo: *Author*

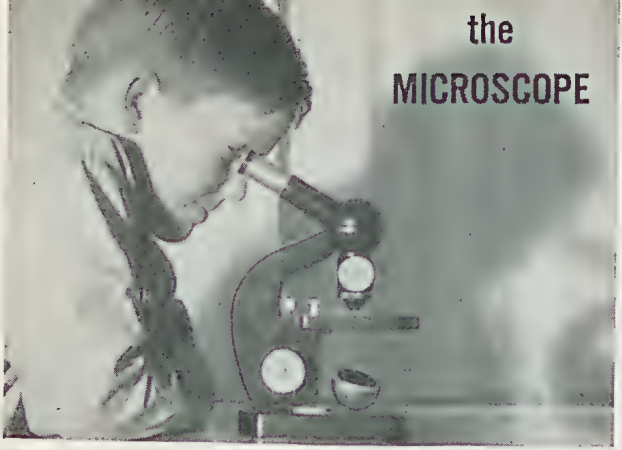
S.O.S. from U.S.A.

The Director of the Harvard University, Dr. I. Mackenzie Lamb, has written to ask whether any member of the Field Naturalists who make excursions to the higher mountains of Victoria would be willing to collect material of a lichen genus called *Stereocaulon*, which grow on rocks or soil at high altitudes, and are whitish grey in colour. The fruit bodies are dark brown or blackish. Dried material with full locality data, altitude, collector's name, and date, should be included. Dr. Lamb has said that he would be most grateful to anyone who could render assistance in this regard, and adds that the collector's name would be formally acknowledged in his world monograph when published.

Material and records should be packed in a crushproof box and addressed to:—Dr. I. Mackenzie Lamb, 20 Divinity Ave., Cambridge, Mass., U.S.A., or can be sent to:—Mr. Ken Trotter, 24 Grandview Ave., Pascoe Vale, Vic., for shipment. Parcel should be marked "BOTANICAL SPECIMENS".

Printed in Error:

In the *Naturalist* for December 1966, on pages 326-7, a list of specific names of insects was inadvertently printed alongside the common names. When referring to these lists in future, disregard the specific names.



No. 7

THE FLEA

By E. J. LeMaistre

The much despised flea has every reason for its unpopularity because, apart from the very irritating result of its bite, the flea has been responsible for the death of many millions of human beings. Acting as a transmitter of Bubonic plague it accounted for at least 25,000,000 people in one epidemic in Europe, in the years 1347-8. As well as bubonic fever, fleas have been found to carry other disease-producing organisms.

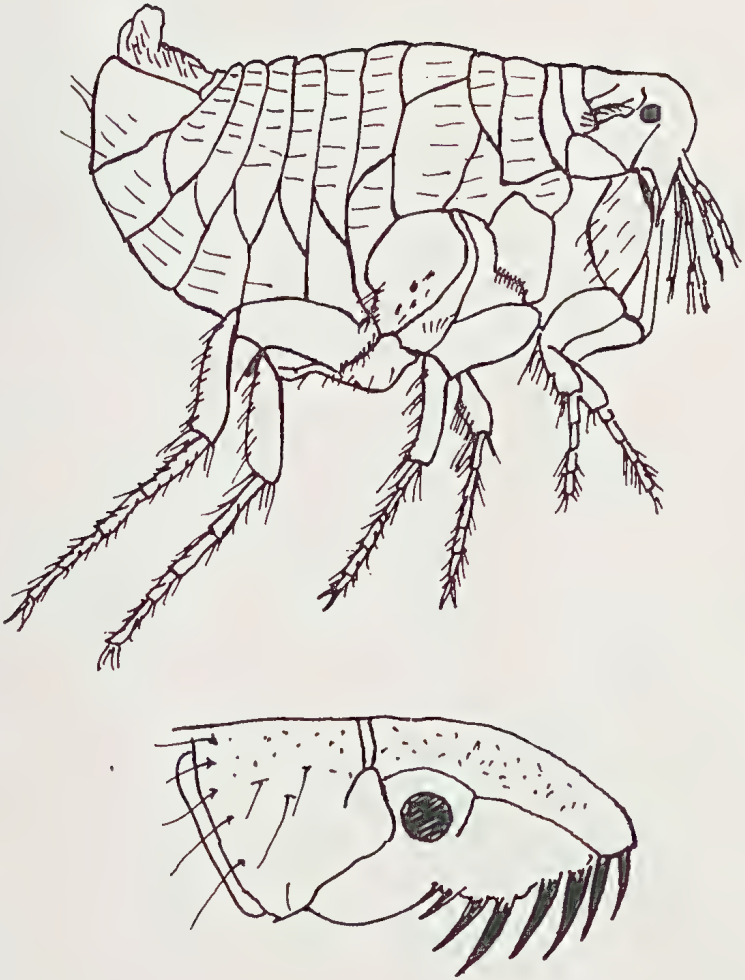
Despite its disfavour however, the flea makes a very interesting study when viewed under a microscope, and the reader could find a new hobby in collecting fleas from birds and animals. An interesting point, by the way, is that the Ungulates do not harbor fleas; they are found on animals with claws, not those with hooves.

Fleas lay tiny oval eggs, mostly in the dust on the floor of the nest or home of the host, and, after a few days, hatch into a grub-like larva which pupates in a thin silken cocoon. Inside the cocoon, the insect transforms and emerges as a complete flea, ready to make its presence felt in no uncertain manner.

Like other insects, the body of the flea is divided into three main parts: head, thorax and abdomen. The head bears the eyes, antennae, and mouth parts. The thorax or chest region has three segments, almost wholly occupied by the muscles acting on the six legs which, especially the hind pair, are very powerful, enabling the insect to hop an amazing distance of up to 13 inches in one jump. (If man had the leaping power of some fleas he could jump with ease over some of our taller buildings.) The abdomen has ten segments and contains the vital organs.

It will be seen that fleas have an external skeleton, like crabs and lobsters, and in the case of the flea, is composed of a horny substance called chitin. Examination will show the spiracles or breathing apertures in this shell from which air is conveyed to the blood by a system of air tubes which extend into every part of the body.

Owing to the fact that the chitin is very dark in color, the microscopist should soak the flea in 10% caustic potash until it has become a light golden brown, when it will be reasonable transparent. (Be careful when using caustic, because it can cause a bad skin and tissue burn. If any happens to contact the skin, wash freely with water, and apply some weak neutralizing agent such as vinegar or lemon juice. Seek medical advice of course, if severe burns occur.)



Top—Side View of Common Flea

Lower—Head of Cat Flea

close to nature

How many of us realize just how close we are to nature; and with what little effort it can be studied?

From the fluttering moth at a lighted window, to the spiders in the darkest corner of our garden shed; the wonders of the natural world are numerous—to the careful and patient observer!

This month, we begin a series in which a look is taken at some of these creatures which make up this "world in the garden". The aim is not to provide a completely scientific treatise on each subject; but rather to provide enough general detail to stimulate an interest in the things around us.

If the series encourages us not only to look; but to see something in what we are looking at, then it will have served its purpose.

How often have we moved a length of timber, or an untidily placed brick-bat, which have been in close contact with moist or damp soil for some time?

Most of us, having done something similar, cannot have failed to notice a general mass-movement of a group of creatures of various shapes and sizes, which had been sheltering under the object. Perhaps one of the first members of this group to be noticed, is an oval shaped little chap, about $\frac{3}{8}$ of an inch to $\frac{1}{2}$ an inch in length, wearing metallic grey armour plating of dome shape, and making his way resolutely toward some other suitable moist place, away from the sun-light.

Fig. 1 shows the slater "making his way resolutely . . ."

In my childhood, I remember that my grandparents used to pour boiling water over these "pests", never bothering to examine one closely before the mass extermination took place.

These little creatures are of course, commonly called slaters (in other countries they are known as pill or sow-bugs, or woodlice). They belong to the same class of animals as do the lobsters and crayfish. This is the class Crustacea, most of the members of which are aquatic. But the slaters have adapted themselves, so as to be fairly well-established land-dwellers.

If we look closely enough at a slater, we find that there are seven pairs of equal sized legs, one pair belonging to each segment of the chest or *thorax*. This, therefore, gives the slater seven segments to the thorax. From the fact that the legs are equal in size and shape, the name of the Order to which slaters belong, is the Isopoda. There are a number of different families, or *genera* of woodlice, but the one with which we are most familiar belongs to the Armadillidiidae. The first two syllables of the word suggest the name of a South American animal, the armadillo. This animal and the slater have one thing in common—when in danger they have the ability to roll themselves into a neat ball, Fig. 2, by virtue of the

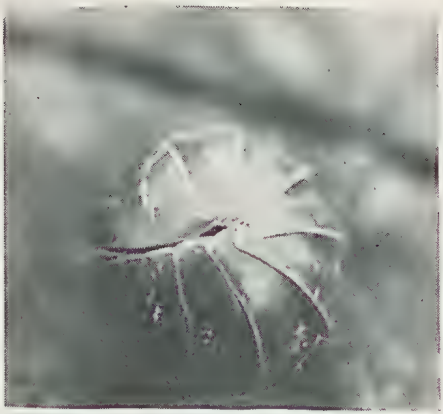


Fig. 2, showing the perfect overlapping of segmental plates when slater is "rolled up".

segmented plates covering the dorsal, or top-side of the animal, being able to slide over one another in either direction.

The antennae of the slater also, are specifically adapted to conform neatly with this ability to roll up, and are found to be more or less double jointed at a point about half way along their length.

Mention was made earlier, that the slaters had adapted themselves to a life on land. This adaptation however, is only possible, provided that a habitat of the right moisture content and temperature is available.

In fig. 3, two white patches may be seen on the abdominal segment. These are called *pleopods*, and contain breathing tubes or *pseudotracheae*, which must be kept moist for the slater to carry on normally.

In the female, pairs of plates on the *ventral* or underside of the body, appear on certain of the segments of the thorax, and together, form a brood pouch where eggs and newly hatched young are carried (Fig. 3). The young slater looks very much like the adult except in size and colour.

As for being a pest in the garden; I think that this claim, unless they appear in vast numbers, maybe an exaggeration. In fact, on the contrary, they act as fairly efficient scavengers of rotting and decaying vegetable matter.

Fig. 3, showing the underside of female slater, where developing young can be distinguished in the brood pouch. Note also the pleopods (2 white patches) on the abdominal segments.

BOOK REVIEWS

Land of Wonder

by Alec H. Chisholm
(Published by Angus and Robertson; $4.20)

313 pages, illustrations in monochrome from drawings on silk, by Margaret Coen. Available from booksellers.

Newer members may be unaware that Mr. Chisholm has a membership of this club dating from 1933, and that he was Editor of the *Victorian Naturalist* from 1940 to 1949. Qualified for his task by his own extensive and authoritative works on natural history, Mr. Chisholm has revealed here the depth and breadth of his reading, in compiling this anthology of Australian nature writing.

The articles are conveniently grouped in the usual natural divisions, with an extra section for landscape. As the extracts number 155, this has had a limiting effect on the length of each. It is not surprising to find over 3 pages of acknowledgements. The writers include explorers and settlers, journalists and novelists, soldiers and sailors, specialists, amateurs and humble nature lovers. The time spanned is from 1770 to the present day.

Touching so many points in time, place, and subject matter, this book should prove a welcome addition to the library shelves of our nature-lovers. In all, a delightful book for casual reading.

A. J. H. Fairhall

The Junior Naturalist

The name of Crosbie Morrison will never die, and it is pleasing to know that his broadcasts—listened to by the largest audiences in Australasian radio history—live again. "The Junior Naturalist", published by Whitcombe & Tombs Ltd. and priced at only $2.35, is an ideal gift for the child (or grown-up) interested in Natural History. Told in the simple manner that only Crosbie Morrison could tell is a story of many things—of birds, insects, fungi, flowers, fishes, animals. In fact all things that interest the young naturalist appear in this book. It is delightfully illustrated by Nancy Adams, and is a must in the library of every young Australian.

Roy Wheeler

WANTED—Victorian Naturalist, January 1966.

Any member who possesses any unwanted copies of the above, please arrange to hand them on to Mr. Eric Allen.

Fauna and Flora of the Powelltown/Labertouche State Forest

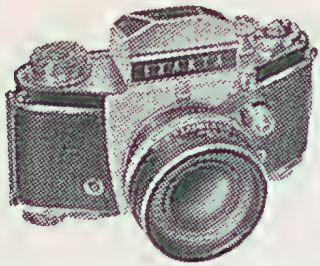
In the "Victorian Naturalist" for December 1966, mention was made on p. 310, of Australian Fauna and Flora Lectures; and also that a list of required illustrations would be given in this current issue. This is the list, which also provides good material for those interested personally in the area.

Anyone desirous of helping in providing any of these slides, should contact Mr. G. Albers, on 53 8181 Ext. 380; before 28th February 1967.

FAUNA
- Tiger Cat
- Tuan
- *ANTECHINUS* (2 or 3 species)
- Long-nosed Bandicoot
- Short-nosed Bandicoot
- Silver Grey Possum
- Leadbeater's Possum
- Eastern Pigmy Possum
- Ringtailed Possum
- Greater Glider
- Sugar Glider
- Feather-tailed Glider
- Wombat
- Grey Kangaroo
- Black Wallaby
- Potoroo
- Swamp Rat
- Broad-toothed Rat
- Eastern Water Rat
- Grey-headed fruit Bat
- Insectivorous Bats (several species)
- Platypus

ORCHIDS
- *Chiloglottis gunnii,* Bird Orchid
- *Corysanthes diemenica,* Helmet Orchid
- *Thelymitra pauciflora,* Sun Orchid
- *Calena major,* Duck Orchid
- *Diuris maculata,* Leopard Orchid
- *Glossodia major,* Waxlip Orchid
- *Calochilus robertsoni,* Brown Beard

BIRDS
- Swamp Harrier
- Australian Goshawk
- Wedgetailed Eagle
- Whistling Eagle
- Brown Hawk
- Nankeen Kestrel
- Crimson Rosella
- Eastern Rosella
- Kookaburra
- Pallid Cuckoo
- Fantail Cuckoo
- Horsfield Bronze Cuckoo
- Golden Bronze Cuckoo
- Swallow
- Fairy Martin
- Jacky Winter
- Scarlet Breasted Robin
- Flame Robin
- Grey Fantail
- Willy Wagtail
- Satin Flycatcher
- Yellow Robin
- Black Faced Cuckoo Shrike
- Spotted Quail Thrush
- Brown Thornbill
- Striated Thornbill
- Yellow Tailed Thornbill
- White Browed Scrub Wren
- Blue Wren
- Lyrebird
- Dusky Wood Swallow
- Magpie Lark
- Grey Thrush
- Golden Whistler
- Rufous Whistler
- Eastern Whipbird
- Mountain Thrush
- White Backed Magpie
- Grey Butcher Bird
- Pied Currawong
- Silvereye
- White Throated Tree Creeper
- Grey Currawong
- Mistletoe Bird
- Spotted Pardalote
- Eastern Striated Pardalote
- White Naped Honeyeater
- Brown Headed Honeyeater
- Eastern Spinebill
- Yellow Faced Honeyeater
- White Eared Honeyeater
- Crescent Honeyeater
- Yellow Winged Honeyeater
- Bellminer
- Red Wattle Bird
- Red Browed Finch
- Raven
- White Winged Chough
- Western Rosella
- Yellow Tailed Black Cockatoo
- Gang Gang Cockatoo
- Ground Thrush
- Pink Robin



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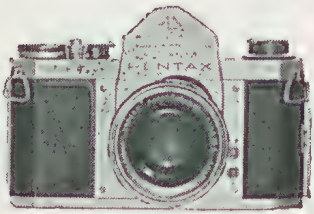

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Correspondance on Whipstick Mallee area

Considerable correspondence has been written between the Dept. of Crown Lands and Survey, and the Bendigo F.N.C. and F.N.C.V., regarding the continued alienation of Crown Land in the Parishes of Whirrakee, Neilbourough, and Huntly.

The present situation, after our Club had endorsed the action of the Bendigo F.N.C. in a letter to the Department concerned, is indicated in the last two paragraphs of that Department's reply—

"Following a discussion with the Soil Conservation Authority, it has been decided to list this area for consideration by the Land Utilization Advisory Council in its second study project.

Accordingly, it is unlikely that an early decision in this matter will be possible."

It is therefore, still not known, what is to be the outcome of this valuable area which contains so many species of fauna and flora, peculiar to the environment.

Excursion to the Whipstick, Bendigo

In view of the current threat to what remains of the unique Mallee 'Whipstick' areas near Bendigo, more than usual interest was evinced by the F.N.C.V. excursion of Sunday, 16 October, 1966. The coach party was accompanied by many members in private cars, including some from Bendigo, Ballarat and Frankston clubs. The Melbourne excursionists travelled via Kilmore and Heathcote, and were met in Bendigo by Mr. Frank Rob-

bins, who acted as an efficient and enthusiastic guide throughout the day.

Mr. Robbins, who had recently returned from the F.N.C.V. trip to Queensland, has been a prime mover in efforts by the Bendigo Field Naturalists' Club and other responsible Bendigo citizens to persuade the Lands Department to reserve permanently all Crown lands still remaining of the 'Whipstick' mallee scrub, in the parishes of Neilborough, Whirrakee and Huntly. Some blocks recently alienated are already cleared and under wheat, so the conservation measures are extremely urgent. It was noted that some of the best wildflower areas, such as those with massed displays of Golden Pennants (*Loudonia behrii*), were on ground supporting re-growth of harvested Blue Mallee (*Eucalyptus fruticetorum*) and Green Mallee (*E. viridis*), so it was not surprising to learn that there is no desire for the proclamation here of a national park, which would involve exclusion of eucalyptus oil distillers, four of whom at present hold licences to take foliage from unalienated Crown blocks. Mr. Robbins, who distributed small maps showing the habitats of the rarer species of flora, displayed a large map showing the details of the blocks necessary to be permanently reserved. Much local support has been forthcoming since the visit, organized from Eaglehawk, of about one thousand "Bendigonians" a stream of cars some months ago, when many local people learned for the first time the full extent of the unique asset they were in danger of losing.

The Whipstick was entered on our excursion from a road that leaves the main Echuca road just before reaching Huntly shire hall, and visitors were charmed near the Neilborough signpost by massed specimens of *Westringia rigida,* uncommon elsewhere but common here (later we were taken to a single bush, growing near a waterhole, of *W. crassifolia,* a mauve-flowered locally endemic species). Various stops were made for botanizing along various Forests Commission roads through the primitive mallee, of particular interest being the Scarlet Mint-bush (*Prostanthera aspalathoides*), Rosy Heath-myrtle (*Baeckea ramosissima*), Clubleaf Phebalium (*P. obcurdatum*), Small-leaf Waxflower (*Eriostemon gracilis*), Golden Pennants (*Loudonia behrii*), Wedge-leaf Hop-bush (*Dodonaea cuneata*), Blue Dampiera, Golden Everlasting, and many more.

A most interesting feature of the visit was the location and inspection of three old mounds of the Mallee Fowl or Lowan, the last living representatives of this 'incubator-bird' having been seen in the area in 1926 (we were told that in 1900 they were plentiful enough to be sold in the poultry market in Bendigo!). The party was photographed on one of these mounds, the 54 people being easily accommodated on the huge mass of pebble-covered earth containing over 50 cubic yards of material and measuring 50 yards in diameter—the work, Mr. Robbins suggested, of several generations of birds over many years. These mounds were unique in being made of gravel covered by the kind of pebbles typical of this auriferous region, instead of the sand of more typical habitats further north; it seems an excellent example of hereditary behaviour being adapted by the bird to a different environment, as the quickly variable heat control provided by the addition or subtraction of pebbles would be a labour-saver.

A visit was paid to the eucalyptus factory of Mr. E. Hartland, who showed by his attitude and in his conversation that he is conservation-

minded. He showed samples of the oil produced by his own stills and some being imported from China, reportedly being distilled from Lemongrass (*Cymbopogon citratus*), and an excellent imitation. He also showed some aboriginal artefacts found on his property.

Thanks are due to Mr. Robbins and members of his club for what they are doing to preserve this unusual area, in particular by fencing certain areas, as on Flagstaff Hill, to protect rarer species of flora. The appended list of flora species was compiled by them, and is published for comparison with the list of D. J. Paton in *'Vict. Nat.'* 40: 189 of Feb. 1924.

List of rarer plants of The Whipstick

(supplied by Mr. Frank Robbins of Bendigo Field Naturalists' Club)

Key: r. = rare; v.r. = very rare; s. = seen during F.N.C.V. excursion.

Acacia brachybotrya (Grey Mulga), r. North Whipstick. s.
A. hakeoides (Hakea Wattle), fine show in masses, Huntly. s.
Acianthus exsertus (Gnat Orchid), v.r.
A. reniformis (Mosquito Orchid), v.r.
Astrotricha ledifolia (Star-hair), v.r. Near ordnance factory. s.
Boronia anemonifolia (Sticky Boronia), fenced in, Spring Gully.
Cassia eremophila, one plant only.
Cryptandra amara (Bitter Cryptandra), v.r. Maiden Gully and Wellsford.
Callitris columellaris (Murray Pine or White Cypress Pine), 2 trees only.
Crowea exalata (Small Crowea), very showy. s.
Choretrum glomeratum (Common Sour-bush), v.r. N. Bagshot.
Calocephalus sonderi (Pale Beauty-heads), r. N. E. Whipstick.
Corybas diemenicus (Slaty Helmet Orchid), v.r.
Dampiera lanceolata (Grooved Dampiera). s.
Eriostemon verrucosus (syn. *E. obovalis*) (Fairy Waxflower), one plant only of a double form. s.
Grevillea rosmarinifolia (Rosemary Grevillea), v.r. s.
Logania floribunda (Narrow-leaf Logania), v.r. Flagstaff Hill. s.
Lissanthe strigosa (Peach Heath). s. In fruit only.
Micromyrtus ciliatus (Fringed Heath-myrtle). s.
Myoporum deserti (Turkey-bush), v.r. One plant? s.
M. platycarpum (Sugar-wood). s. *M. parvifolium* (Creeping M.), v.r.
Olearia decurrens (Clammy Daisy-bush), r. s. *O. floribunda* (Heath Daisy-bush), r. s.
Pterostylis barbata (Bearded Greenhood), v.r.
P. curta (Blunt Greenhood), v.r.
Pomaderris angustifolia (Narrow-leaf Pomaderris), only known locality in central or western Victoria. Now covered by Eppalock Reservoir.
Prostanthera aspalathoides (Scarlet Mint-bush). s.
Prostanthera saxicola var. bracteolata, v.r., 2 localities. s.
Phebalium obcordatum (Club-leaf Phebalium), fenced in, Flagstaff Hill. s.
P. pungens (Prickly Phebalium).
Santalum acuminatum (syn. *Eucarya* and *Fusanus*) (Quandong), Huntly and Mandurang, very few trees. s.
Solanum simile (Oondoroo) v.r. Far north of Whipstick.
Stenochilus longifolius (syn. *Eremophila longifolia*) (Berrigan), v.r. Two trees, Egerton Forest.
Stenopetalum lineare (Velvet Threadpetal), v.r. s.
Veronica perfoliata (Diggers' Speedwell), v.r.
Westringia rigida (Stiff Westringia), plentiful near Neilborough signpost, dainty white flowers. s.
W. crassifolia (so named by Dr. Melville of Kew, who raised it to specific rank, formerly known as *W. rigida var. grevilleana*). Only known locality in the world, showy mauve flowers. s.

The total number of native species in the area is 323+, of which about 40 are confined to the Whipstick and 24 others rarely found beyond it. Species elsewhere in the Bendigo district but not in the Whipstick number 130+.

Commoner Species seen in or near The Whipstick area by the F.N.C.V. Excursionists

Mallee Eucalypts: *Eucalyptus viridis* (Green Mallee), commonest in this area; *E. fruticetorum* (syn. *E. polybractea*) (Blue Mallee), the leaves blue in the young growth, common in S. and W. Whipstick; the best for oil. *E. behriana* (Bull Mallee), round leaves, rather striking smooth brown and green stems, taller habit, not used for oil extraction. N.E., N., C. *E. froggattii* (originally *E. incrassata*) (Yellow or Giant Mallee).

Other Eucalypts: *E. leucoxylon, E. camaldulensis, E. sideroxylon, E. hemiphloia,* etc.

Acacia diffusa, A. acinacea, A. pycnantha, A. flexifolia, A. vomeriformis, A. schlerophylla, A. obliqua; Arthropodium milleflorum, Brachyloma daphnoides, Baeckea ramosissima, Boronia dentigera, Caladenia angustata, Casuarina muelleriana, Cassytha sp., Calytrix tetragona, Calochilus robertsonii, Daviesia genistifolia, D. ulicina var. ruscifolia, Dillwynia glaberrima, Dichopogon stricta, Dianella revoluta, Drosera peltata, Diuris maculata, Dodonaea cuneata, Eriostemon gracilis, Grevillea alpina, Goodenia varia, Hybanthus floribunda, Hibbertia stricta, H. acicularis, Helichrysum bracteatum, H. semipapposum var. brevifolium, Loudonia behrii (Golden Pennants in massed displays in low mallee regrowth areas), *Leptospermum myrsinoides, Leptomeria aphylla, Melaleuca decussata, M. uncinata, M. wilsonii, Olearia teretifolia, Pultenaea pedunculata, Rhagodia* sp., *Prostanthera denticulata, Pseudanthus ovalifolius, Stipa elegantissima, Thelymitra antennifera, T. ? aristata, Vittadenia triloba.*

N.B. The above lists should be compared with that compiled by D. J. Paton in 1923 (see 'The Plants of the Whipstick Scrub, Bendigo', *Vict. Nat.* **40**: 189, 1924).

AT LAST !

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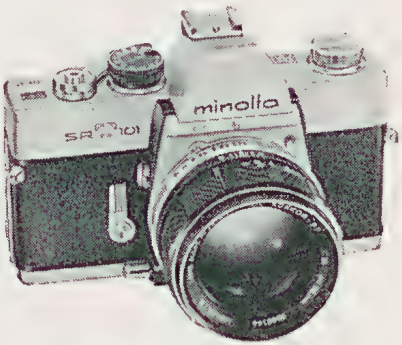

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Field Naturalists Club of Victoria

General Meeting—9 January 1967

Approximately 150 members were present as the President, Mr. M. K. Houghton, opened proceedings on this, the first meeting of the new year.

A note of sadness touched the first few moments of the evening, as the deaths of three former members were announced. Those present stood for a period of silence in memory of Messrs. Saravich and Cohn, and Mrs. Rasmussen. Mr. Swaby spoke of the activeness of Mr. Saravich within the F.N.C.V. He was a Council member and Vice-President, and his interest in Natural History was broad rather than specific. He was a great friend of the late Charles Gabriel.

The life of Mr. Mark Cohn, founder of the Bendigo F.N.C., and F.N.C.V. member since 1926, was recalled by both Mr. Coghill and Mr. Hanks. He took great interest in Natural History and indeed, in any action likely to benefit its progress. As a conservationist, his main interest lay in ornithology and botany.

Mr. Ros Garnet spoke of Miss Rasmussen and her connection with the Club.

The President introduced Mr. Blott, who was to address the meeting on the recent excursion of Members to Queensland, in September and October of last year.

Mr. Blott initially thanked Miss Marie Allender for arranging the excursion, and the Queensland Tourist Bureau for managing it.

With cameras clicking continuously, the party was accompanied in the first stages by the Queensland F.N.C. to the Glass Houses. The wild flowers between Caloundra and Noosa Heads were quite beautiful.

An overnight stop was made at Maryborough, followed by a visit to the Aluminium works at Weipa.

The first of the main two excursion areas, namely Heron Island, was reached by small boats, which take on passengers from the launch, lying at anchor outside the reef. The island consists of coral limestone of an area of about 4 acres above water level, while below water level, the reef measures approximately 4 miles by 2 miles.

Colour slides of the wildflowers and vegetation were shown, together with the burrows of Mutton-birds and the nesting sites in the trees, of the White-capped Noddy. From the reefs, slides were shown of various corals, star fishes, sea cucumbers and crabs. Reef Herons, Gannets and Silver Gulls were among the bird life.

The second area visited was inland—to the southern escarpment of the McPherson Range, where Binnaburra Lodge is located. Here, the lush rainforests gave unlimited pleasure to the lucky party. Currawongs, Satin Bowerbirds, and Scrub Turkeys were among the many birds seen by them; and the orchids and wildflowers were numerous. Many waterfalls in the area were visited, and each one had its own characteristic beauty, as was shown by the fine colour slides.

This was the all-to-soon ending of what had been a most worthy commentary on, and viewing of, some of the episodes which befell those members who were fortunate enough to make the trip. However, Mr. Blott and his projectionist certainly provided the other members with a splendid evening, in which it was not difficult to imagine oneself actually with them on the trip.

Mr. Houghton thanked Mr. Blott and everybody involved, for making the night such a success.

Election of Office Bearers for 1967

A list showing nominees for the various positions of office was displayed, together with those not seeking re-election. These were Mr. M. Houghton, President; Mr. E. H. Coghill, Secretary; Mr. A. G. Hooke, Treasurer; and Miss M. Butchart, Ass. Treasurer.

Under Notes and Exhibits, Mr. Zirkler spoke about some samples of turquoise; Mr. T. Sault exhibited an Elbow Orchid from Warburton, and Mr. E. Allen spoke of the construction of a Welcome Swallow's nest he showed.

Other exhibits on view were—Corals from Heron Island, Okati Nuts from Solomon Islands, Bursaria, *Dianella tasmanica,* Agate from Woolshed Creek, insect specimens set in polyester resin, and Blossom Beetles on lilly-pilly flowers.

From Sandy Bay, Tasmania, samples of Chalcedony, the fossil Fenestalla, and Basanite from Blinking Billy Point were exhibited. Some wildflower paintings by Daisy Wood were also shown.

Due to there being no Council Meeting in December, no new members were elected. Both December and January nominations shall be elected at the February Meeting.

Geology Report 7th December

33 members and visitors attended with Mr. Dodds in the Chair. Mr. Box reported on the Group's week-end excursion to Dunolly, Bealiba, Moliagul and Rheola on November 26th-27th. 28 members journeyed there, and were met by members of local Historical Societies, who outlined the History of the Gold Mining Era in each respective area. Members visited many old workings, and collected rock types and also some excellent Quartz crystals.

Mr. Dodds reported on an excursion attended by about 12 members to the Keilor area, where Archeologists are working the Terraces of the Maribyrnong River, to establish the age of the Aboriginal occupation in the district. The main business of the evening was the election of officers for the following year. The present officers, Mr. R. Dodds, President, joint secretaries Mr. R. Box and Mr. T. Sault, were elected unopposed. The subject for the evening were talks by three members on rock types. Mr. Angior began by describing igneous rocks. He said these rocks were divided chemically according to their silica content. Those with a high silica content were called acid, and those with a low silica content were called basic; and all those in between were called intermediate. Many of them could be picked by their colour, acid rocks being light in colour, and basic rocks dark. He quoted formulas of several minerals common to each group. Orthoclase, a mineral common to acid rocks had three Si atoms in its composition; whereas Olivine, a mineral common to basic rocks had only two Si atoms in its formula. He described how minerals crystallize out of magma until only volatiles are left. Mr. McInnis began his talk on metamorphic rocks, by stating that there were two main types of metamorphism among rocks. The first, contact metamorphism, is where rocks have been changed by heat from molten bodies underneath. These rocks are only at short range from the contact and are termed aureoles. The second type of metamorphism is called regional metamorphism. The rocks in this case are affected by slow heat induction caused by folding. The thermal reactions are slow and affect vast areas. The speaker quoted the metamorphic rocks of N.E. Victoria as an example. He then spoke of contact rocks to be found near Melbourne. These were at Morang, Mooraduc, and Mt. Martha. Mr. Sault concluded the evening by describing the dykes of the Woods Point-Walhalla area, and how they intruded the sharply folded sedimentary rocks in that area in mid-Devonian times. The dykes are mostly of the dioritic type, and many contained large quantities of gold, which has been mined in the past.

EXHIBITS

Mrs. Salau. Tinguaite, Mt. Beauty. Mylonite.
Mr. Davidson. Zoisite, Madagascar. Calcite Rhombs (Iceland Spar).
Mr. Love. Snowflake Obsidian, South America. Sodalite, Brazil. Rhodonite N.S.W. Olivine, Vic.
Mr. McCay. Zircons and Sapphires, Bunyip River. Tourmaline Crystals.
Mr. Box. Quartz Crystals, Bealiba.

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Hawthorn Junior F.N.C.

Report of Activities 1966.

Office Bearers January 1st, 1967.

President: Mr. D. E. McInnes
Secretary: Janet Fitzgerald, 6 North Crt., Surrey Hills
Treasurer: Michael Coulthard
Assistant Treasurer: Susan Beattie
Excursion Secretary: Barry Cooper
Publications Committee: Susan Beattie, Dennis Walsh, Ian Knox, Janet Fitzgerald
Editors: Barry Cooper and Paul Gahan.

The Junior Council consists of 17 members.

Membership:

There was a steady increase in the number of members during 1966, reaching a record of 157 in September.

Attendances at meetings have been the best ever, only rarely falling below the 100 mark. A record 132 members and friends attended our twenty-third birthday night in August.

Five excursions were organized in 1966, two being with the F.N.C.V.

12th February—Pond Life Excursion—Albert Park Lake.
5th March—Gemstone Excursion to Belgrave—Selby district.
17th April—F.N.C.V. Excursion to Bulla—Sydenham.
14th June—F.N.C.V. Excursion to Yuroke—Wallan Districts.
24th September—Wattle Excursion to Maranoa Gardens.

Attendances at excursions were only fair, ranging from about twenty to fifty people.

Publications:

This is undoubtedly the most successful part of the activities of the Club, and five booklets, in addition to our monthly Newsletter, have been produced.

"Bees", edited by Barry Cooper, and given free to members after a talk by Mr. W. Thompson in February on the subject.

"The Junior Naturalist Journal", a general collection of natural history articles, edited by Barry Cooper and illustrated by Paul Gahan. The articles were written by various members of the club, and the booklet sold at 25c.

"Gemstones—Introduction to Collecting in Victoria", written by Paul Gahan, was on sale at the Nature show. Price 15c.

"The Collection and Preservation of Insect Specimens", written by Dennis Walsh. This 15 page booklet was sold for 15c. at the Nature Show.

"Preserving Marine Specimens" by Leigh Winsor was also reprinted. The monthly publication "The Junior Naturalist" had four extra pages added in May 1966. Now, our newsletter, as well as having adequate space for club activities, had additional pages on natural history topics. We are fortunate that most of our typing was able to be done by Mrs. Beattie, and Gary Wallis has helped with some of the printing.

Nature Show—September 1966:

As in previous years, the Club had exhibits at the September Nature Show. The exhibits were:—

1. "Gem Cutting": by Paul Gahan, Frank Moore and Gary Wallis.
2. "The Collection and Preservation of Insect Specimens": by Jenny Forse and Dennis Walsh.
3. "Instant Micro Slides": Carl Meyer, Rosalind St. Clair and others.
4. "The Beauty of Shells": by Phillip Harrison.
5. Junior Projects by individual Club Members.

Ian Knox and Tim Anderson supplied specimens for the Reptile sections.

Ringwood Junior F.N.C.

The first meeting of the "Ringwood Junior Field Naturalists Club", to be held in the North Ringwood Methodist Church Hall, will be at 7.30 p.m. Wednesday, 22nd February, 1967.

Country Club Notes

Field Naturalists Club of Benalla

It gives me pleasure to present to you our fourth annual report. Let us examine the club's activities of the past year.

Guest Speakers—We owe much to those who gave of their time and knowledge to address our meetings. Notable were Mr. R. Davidson—Gemstones; Mr. E. Quinlan—Bushwalking and National Parks; and Miss Grey—Central Australia. Two of our own members to give excellent talks, were Mrs. Hair, on Central Australia; and Mr. Brooke, on Growing Australian Plants.

Club Excursions—Our excursions during the year were all held in beautiful sunshine, and were thoroughly enjoyed. The first was to Middle Creek, Tolmie, during May last year; the second to the Goomalibee area in October; and the third to the Strathbogie Ranges in March. Special thanks are due to Mr. Coish for leading us to the mining areas in the Strathbogies.

Membership—The Club could ill afford to lose the active participation of the Harris family who are now living in Western Australia. They are life members of our club and we continue to treasure their friendship. We are also sorry that Mrs. Lowrie has left to return to New Zealand. We welcome our new members, and must try very hard to gain more members, as we can all add to each other's knowledge.

Extra Activities—*High School Creative Workshop*. The club worked with the Benalla Arts Group by providing educational excursions for High School Students at the conclusion of their school year. They were taken to Dookie College, and to examine lapidary and microscopic work. Those members of our club who took part, did a fine job, and as this was no small effort on their part, they deserve our hearty thanks.

Technical School Hobbies Exhibition—The club gave an excellent display. Mrs. Templeton and Mrs. Cummings put in a great deal of work, and I would like to thank Mrs. Templeton for bringing exhibits to our meetings throughout the year.

Wangaratta Movement—Our club was well represented at Harrietville, where a meeting was held to discuss the formation of a club such as ours, in Wangaratta.

Junior Naturalists—Mr. E. Harrison is working with the newly formed Junior Field Naturalists at the Benalla Technical School.

MATTERS OF CONCERN

Reef Hills. Spring burning of the Reef Hills was questioned by the club and our president was in touch with the authorities on the matter.

Ibis Rookery. Mr. Fink is doing fine work in trying to develop and preserve the ibis rookeries at Baddaginnie. Drainage schemes that threaten to destroy these breeding grounds are afoot.

Warrenbayne. Mr. E. Harrison is doing his best to preserve the threatened habitat of the many animals to which he has devoted so much time and study.

Meetings—The average attendance at meetings was twenty-three persons. Time spent on business matters is to be decreased.

Office Bearers—Many thanks to Mrs. Brooke for accepting the office of Vice-President left vacant during the year. We urgently need members prepared to accept office in the club.

It has been a privilege to serve under Mr. Say, whose knowledge and wide experience is such an asset to us.

Ouyen District Naturalists Club

Extracts from Annual Report—21 August 1966.

The President, Mr. G. B. Eggleton, regretted that the previous year had been one of little progress, and a certain loss of interest in nature activities. Also a number of members had left due to occupational transfers.

He pointed out that the aims of all clubs connected with fauna and flora were worthy of the support of every thinking Australian.

However, in spite of these things of the past year, several achievements were worthy of mention.

Following persistent reports of wild pigs in the Kulkyne State Forest, machinery was set in motion which prompted the Senior Forest Officer at Mildura to prepare a report for his Department.

The possibility of the closure of Mr. Reg Dart's aviary at Lascelles, was brought to the notice of the public, and it is pleasing to know that the aviary is still open to the visitors. This aviary has great educational value, and an appreciative letter was received from Mr. Dart.

Correspondence showing evidence that a balance between wild life preservation and land development should be attempted under the Millewa Land Development Extension, was submitted to the State Development Committee. No finding had been released to date, and therefore, all members of Natural History Clubs were urged to lend their support to this endeavour.

Specimens submitted to the Museum during the year were of Mitchells Hopping Mouse, and a rare snake—the Short-tailed Snake.

All the material for the building of a hut at Hattah has now been purchased, and all that is required now is the willing labour to erect it.

Office Bearers for 1966/67

President: Mr. G. B. Eggleton

Vice-President: Mr. H. Wheeler

Secretary/Treasurer: Mrs. A. Eggleton

Committee: Miss Doris Munro, Mrs. Buckingham, Mr. A. Torpy, Mrs. Beare, Mr. Buckingham, Mr. J. Beare.

Warrnambool Field Naturalists Club

President's Report from Annual Meeting 1965/66

Increased membership of 50 Seniors and 13 Juniors, and attendance at meetings, has made another successful year for the club.

Guest speakers for the year have been:

Miss Halford—"Life in the back country of the Northern Territory".

Mr. I. M'Cann—"The Grampians".

Mrs. Bedgood—"The Natural History of the Ballarat District".

Mr. Claude Austin—"The Gulf Country of Queensland".

Members of our own club who gave the main address at meetings were Mesdames Negrello and Mathieson who spoke of their trip to Western Australia; Mr. Don Taylor "Bird Observations", particularly with regard to the Rock Parrot; Mr. J. L. Martin, "Items of interest to Field Naturalists observed on a tour of Europe"; and Mr. Illedge arranged a movie film night.

Junior members have given the "Do you know" deliberation at three meetings.

Field days took place to The Rifle Range at Port Campbell, The Orford District, Mount Eccles, and to Mt. Napier.

We have supported the move to have portion of the Framlingham forest reserved as a Wild Life Sanctuary, and assisted with tree planting, and carting of stone, for the building of the museum at Tower Hill.

Our delegates, and a number of members, attended the following meetings of the Western District Field Naturalist Clubs' Association; The Spring Meeting at Hamilton, the Annual Meeting at Maryborough, and the Autumn Meeting at Colac.

Finally, I would like to express our appreciation of the excellent service that has been given by Mr. F. Shirrefs as librarian, Mrs. Negrello as recorder, and Mr. J. Edge as secretary and treasurer.

J. L. MARTIN,
President.

For the coming year, Mr. R. Illedge succeeds Mr. Martin as President, and Mr. R. J. Edge continues as Secretary.

F.N.C.V. DIARY OF COMING EVENTS

GENERAL MEETING

Monday, 13 February—At National Herbarium, The Domain, South Yarra; commencing at 8 p.m.

1. Minutes, Reports, Announcements.
2. Correspondence.
3. Subject for the evening: "West of Alice"; Messrs. J. H. Willis and A. Morrison.
4. Election of New Members.

(a) *Ordinary*
Dennis Basso, 4 Dick Street, Ivanhoe.
R. L. Cowling, 14 Viviani Cres., Heathmont.
Rex Davis, 45 George St., Ashwood.
Miss Estelle DeBoshier, Beaumont St., Vermont.
Miss Jean McDowell, 2 Cambridge St., E. Brighton.
Miss A. I. Rahilly, 65 Bayswater Rd., Croydon.
Mrs. K. I. Stracke, 3 West Court, Burwood. (Interest—Animals)
Mr. F. E. Thompson, Flat 5, 24 Mason St., Hawthorn.
Mr. Eric Williams, 11 Scott St., Kew.
Joint—Misses J. A. Long and F. E. Elliott, 281 Walsh St., South Yarra.
Mr. and Mrs. Leonard K. Cox, 5 Orloff St., East Bentleigh. (Interest—Mammals, Botany).

(b) *Country*
Mrs. I. W. Walter, Callawadda, via Stawell, Victoria.
Joint—Mr. and Mrs. Norman W. Vincent, 5 Greene St., Bairnsdale West, Victoria.

(c) *Junior*
Philip Carter, 177 Glen Iris Road, Glen Iris, S.E. 6.
Robert R. Marston, 71 Winter Cres., East Reservoir.
David H. Ward (age 9 years), 32 Creswell Cres., Mitcham. (Interest—Reptiles)

5. General Business.
6. Nature Note and Exhibits.

Monday, 13 March—Annual Meeting. Subject for evening: "Mosses, Lichens and Liverworts"; Mr. A. Swaby.

GROUP MEETINGS

(8 p.m. at National Herbarium unless otherwise stated)

Wednesday, 15 February—Microscopical Group. Members will show Club slides under their own microscopes.

Friday, 24 February—Junior Meeting at 8 p.m. at Hawthorn Town Hall. Subject: "Bats"; Mr. J. Hyatt.

Wednesday, 1 March—Geology Group.

Thursday, 2 March—Mammal Survey Group; at Fisheries and Wildlife Dept. Library at 7.45 p.m.

Friday, 3 March—Preston Juniors Meeting at Rechabite Hall, 251 High Street, Preston.

Monday, 6 March—Entomology and Marine Biology. This meeting is held in Mr. Strong's rooms in Parliament House at 8 p.m. Enter through private entrance at south end of House.

Thursday, 9 March—Botany Group.

F.N.C.V. EXCURSIONS

Sunday, 19 February—Phillip Island. The coach will leave Batman Avenue at 9 a.m. Fare $2.00. Bring two meals.

Saturday, 29 April, Sunday, 30 April—Arrangements are being made for a weekend excursion with the Latrobe Valley F.N.C. visiting South Cascade Creek on Saturday. Details in next issue.

Field Naturalists Club of Victoria

Established 1880

OBJECTS: To stimulate interest in natural history and to preserve and protect Australian fauna and flora.

Patron: His Excellency Major-General SIR ROHAN DELACOMBE, K.B.E., C.B., D.S.O.

Key Office-Bearers, 1966

President:

MR. M. K. HOUGHTON
61 Winton Road, South Ashburton (25 1914)

Vice-Presidents: MR. A. J. H. FAIRHALL, MR. T. SAULT

Immediate Past President: MR. D. E. McINNES

Hon. Secretary: MR. E. H. COGHILL, 15 Baker Avenue, North Kew (85 4413).

Hon. Treasurer: MR. N. M. TAYLOR, 15 Hopetoun Road, Toorak (20 5358).

FNCV Accountant: MR. R. L. SMITH, 430 Little Collins Street, Melbourne, C.1 (67 3131).

Hon. Editor: MR. G. M. WARD, 54 St. James Road, Heidelberg N22.

Hon. Librarian: MR. P. KELLY, c/o National Herbarium, The Domain, South Yarra, S.E.1.

Hon. Excursion Secretary: MISS M. ALLENDER, 19 Hawthorn Avenue, Caulfield, S.E.7.

Hon. Sales Officer: MR. E. R. ALLAN, c/o National Herbarium, The Domain, South Yarra, S.E.1.

Group Secretaries:

Botany: MRS. P. E. MATCHES, Flat 3, 33 Abercrombie Street, Balwyn (80 3651).

Geology: MR. R. BOX, 19 Fulham Grove, Reservoir (47 5393).

Microscopical: MR. P. GENERY, 42 Barnard Grove, Kew (86 5851).

Fauna Survey: MRS. R. FRANKENBERG, 14A Glassford Street, Armadale, S.E.3.

Entomology and Marine Biology: MR. J. W. H. STRONG, Legislative Council, Parliament House, Melbourne, C.2.

MEMBERSHIP

Membership of the F.N.C.V. is open to any person interested in natural history. The *Victorian Naturalist* is distributed free to all members, the club's reference and lending library is available, and other activities are indicated in reports set out in the several preceding pages of this magazine.

Rates for January-December 1967 are:

Ordinary Membership	$5.00
Country Membership (over 20 miles from G.P.O., Melbourne)	$4.00
Junior Membership (under 18 years)	$2.50
Subscription to the *Victorian Naturalist* (non-members)	$4.00

Note: The currency of the present club year and Volume 84 of the *Victorian Naturalist* is from January to December, 1967.

Brown, Prior, Anderson Pty. Ltd., 5 Evans Street, Burwood, E.13.

the VICTORIAN NATURALIST

Vol. 84, No. 3 MARCH, 1967

Published by the

FIELD NATURALISTS CLUB OF VICTORIA

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The Victorian Naturalist

Editor: G. M. Ward

Vol. 84, No. 3 9 March, 1967

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Front Cover:

This is one of a number of photographs taken by Charles Barrett, in the 1920's. It is of the Eastern Water Dragon, which is common along the water courses of South-east Gippsland, where quite often it is heard rather than seen; for it has the habit, on being startled, of launching itself from a sun-drenched branch with a splash into the water below.

Readers' Nature Notes and Queries

These columns are available for all members, young and old, to bring before others their own observations in nature. Correspondence may be sent to the Editor, 54 St. James Road, Heidelberg.

These interesting observations are from Mr. D. L. Jones of Balwyn, a suburb to the east of Melbourne.

After reading the article "Once in the Suburbs", in the July '67 issue of the *Victorian Naturalist*, I have been prompted to compile a list of the native birds of our area. As a result of this I was quite surprised at the number of species that still exist in this closely settled suburb. The area is very close to Maranoa Gardens, Balwyn. This no doubt serves as an attraction to the birds, by virtue of its food source, shelter and retreat from the rigours of civilization. The park is in fact such a haven for the birds, that it has prevented our suburb from becoming a virtual red-roofed desert as have many others.

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BOOKS

On Natural History,

Australia, Art, General.

New and Secondhand.

Lists Free. State Requisites.

In all at least 26 species visit the area or are residents. The actual number may easily be more than this however.

LIST OF BIRD SPECIES OBSERVED IN THE BALWYN AREA

[compiled 26/7/66]

Mudlark (*Grallina cyanoleuca*), breeds.
Black-backed Magpie (*Gymnorhina tibicen*), breeds.
Grey Butcher-bird (*Cracticus torquatus*), visitor.
Striated Thornbill (*Acanthiza lincata*), semi-permanent, may breed.
Yellow-tailed Thornbill (*Acanthiza chrysorrhoca*),
Pallid Cuckoo (*Cuculus pallidus*), visitor. semi-permanent.
Willy Wagtail (*Rhipidura leucophrys*), breeds.
Grey-backed Silver-eye (*Zosterops lateralis*), breeds.
White-plumed Honeyeater (*Meliphaga penicillata*), breeds.
Eastern Spinebill (*Acanthorhynchus tenuirostis*), breeds.
Regent Honeyeater (*Zanthomiza phrygia*), ?
Red-wattle Bird (*Anthochaera carunculata*), breeds.
Noisy Miner (*Myzantha melanocephala*), ?
Grey Thrush (*Colluricincla harmonica*), visitor.
Black-faced Cuckoo Shrike (*Coracina novachollandiae*), visitor.
Kookaburra (*Dacelo gigas*), visitor.
Crimson Rosella (*Platycercus elegans*), visitor.
Musk Lorikeets (*Glossopsitta concinna*), semi-permanent.
Galah (*Kakatoe roseicapilla*), visitor.
Gang-gang Cockatoo (*Callocephalon fimbriatum*), visitor.
White-browed Wood-swallow (*Artamus superciliosus*), visitor.
Welcome Swallow (*Hirundo neoxena*), semi-permanent.
Blue Wren (*Malurus cyaneus*), breeds.
Chicken Hawk (*Accipiter cirrocephalus*), ?
Eastern Shrike-tit (*Falcunculus frontatus*), visitor.
Southern Yellow Robin (*Eopsaltria australis*), visitor.
Flame Robin (*Petroica phoenicea*), visitor.
Raven
Owl—species unidentified.

Maranoa Gardens in Camberwell, Victoria, is an example of the good judgement and foresight that was possessed by some of our city forefathers. It is regrettable that so many others allowed similar land to fall into the hands of the ruthless subdividers.

However, observations such as these of Mr. Jones, are invaluable in maintaining a census of species distribution.

SECRETARY'S REPORT

The Eighty-Seventh Annual Report 1966

The year last past has been a year of calm, we hope not the calm before the storm. We changed our Editor last year and next year we expect a change in President, Treasurer, Assistant Treasurer, Auditor, Assistant Editor and Secretary, so things should be different at any rate.

Membership

Membership is on the increase again after two shake-ups due to the change in the Club's financial year and drastic pruning of unfinancial members from the mailing list. We have now 576 ordinary, 303 country, 43 junior and 108 subscribers, a total of 1030. Last year the figures were 540 ordinary, 310 country, 43 juniors and 102 subscribers, a total of 995. There are also 25 affiliated clubs compared with 24 last year. This does not include Sale F.N.C. which subscribes to the *Naturalist*, and would be welcomed as an affiliated club. In a club the size of ours we must expect losses of senior members from time to time, and this year has seen the passing of many valued friends; including Miss May Burton, Mrs. Violet Hastings, Mr. Marc Cohn (a foundation member of the Bendigo Club), and Mr. T. H. Sarovich who was well known to most members of the F.N.C.V.

Organization

The growth of the club has had the effect of making it more and more difficult to procure Honorary Officers to do all the work of running the club. Therefore Council has taken the step of appointing a paid part-time Accountant who in addition to keeping the club's records, will take over the management of the Membership lists, the collection of subscriptions, and so forth. This will probably mean an increase in our expenses, with perhaps an increase in subscriptions.

Nature Show

As usual our Nature Show in the Lower Melbourne Town Hall in conjunction with the Society for Growing Australian Plants was an outstanding success. We would like to mention the magnificent displays staged by the Hawthorn Junior F.N.C. There is no doubt that projects such as this show give a wonderful boost to the feeling of Club solidarity and the Club is very gateful to all those who took part.

Excursions

Last year we had two big excursions; one to Queensland, and the other to Wangaratta district, in addition to the usual syllabus excursions every month, which gave members the opportunity to see any of the beauties of Victoria. The Club thanks those who arranged and led these excursions, especially our Excursion Secretary Miss Marie Allender. We must also thank those members and non-members who lectured to us during the year, and who provided interesting material for the *Victorian Naturalist*.

Wild Life Protection

Apart from such matters as these mentioned, the principal activity of the Club seems to be the attempt to preserve and protect Australian Flora and Fauna. In particular we can take some of the credit for the removal of the wombat from the list of vermin for which a bounty is paid. They are still officially vermin but no bounty is paid for their destruction. There are many areas where we should have additional parks or some other form of preservation. Among the numerous instances in this State and elsewhere where we have felt it to be our duty to press for more protection for native animals and plants, we may mention that we have joined in the outcry against the project to blow up a Cormorant Rookery in Tasmania, and to destroy forests in tropical Queensland. Nearer home we have supported projects for National Parks and Nature Conservation Reserves in the Lower Glenelg area, the Millawa extension, Barmah Lakes, the Whipstick Mallee, and many other similar areas. An interesting part about the Millawa Project is the proposal by the Ouyen District F.N.C. that the cost of establishing the Park should be treated as part of the expenses of opening up the country and the cost of doing so should be added to the price of the land.

Medallion

The Natural History Medallion for 1965, was awarded to Mr. Roy Wheeler, the presentation being made at a General Meeting by Mr. E. S. Hanks. The award for 1966 has not yet been announced. The Adolph Basser Library requested us to supply them with a copy of the Medallion to add to their collection of scientific awards. This we did with pleasure and we also have pleasure in recording that the makers of the Medallion, Messrs. Stokes (Australasia) Limited donated a copy, with case, for the purpose.

FIELD NATURALISTS' CLUB OF VICTORIA

BALANCE SHEET AS AT 31st DECEMBER, 1966

(Figures adjusted to nearest $1)

Year 1965	Liabilities		
$268	Subscriptions paid in advance ..		$304
452	Sundry Creditors		515
528	M.A. Ingram Trust grant in hand		664
	Special Funds and Accounts—		
3,280	Building Fund	3,244	
4,386	Publications Fund	3,946	
100	Library Fund	100	
334	Club Improvement Account ..	189	
200	Excursion Account	200	
5,216	Estate Marion Wright Legacy	5,217	
—	Estate Ruby A. Lewis Legacy	418	
758	Microscope Project Account	905	
—	Reserved Income Account ..	922	
			15,141
4,460	Surplus of Assets over Liabilities		4,618
$19,982			$21,242

Year 1965	Assets		
	Current Assets—		
$2,676	Bank Current A/c and Petty Cash	$3,841	
152	Sundry Debtors	675	
2	Badges on hand, at cost	72	
190	Books on hand for sale, at cost	136	
216	Microscope Project Stock at cost	89	
			$4,813
3,740	Library, Furniture and Equipment, at cost		3,899
	Investment of Funds—		
	Building Fund—		
2,100	Comm. Bonds, at cost ..	2,100	
1,000	S.E.C. Stock, at par	1,000	
180	E.S. & A. Bank, No. 2 A/c	144	
			3,244
	Publications Fund—		
1,200	Comm. Bonds, at cost ..	1,200	
	Stocks valued at cost—		
430	Victorian Ferns	353	
1,086	Victorian Toadstools ..	973	
1,112	Wyperfeld Nat. Park ..	785	
72	Sundry Debtors	63	
486	E.S. & A. Bank, No. 3 A/c	572	
			3,946
	Library Fund—		
100	Comm. Bonds, at cost ..		100
5,200	Legacy, Estate Marion Wright— Comm. Bonds at cost		5,200
40	Cosstick Reserve, Maryborough, at cost		40
$19,982			$21,242

I report that in my opinion the accompanying Balance Sheet and Accounts are properly drawn up in accordance with the provisions of the Companies Act 1961 and so as to give a true and fair view of the state of the Club's affairs at 31st December 1966 and of its operations to that date, also that the accounting and other records examined by me are properly kept in accordance with the provisions of the Act.

SIGNED: W. P. J. EVANS

17/1/1967

FIELD NATURALISTS' CLUB OF VICTORIA

GENERAL ACCOUNT

STATEMENT OF RECEIPTS AND PAYMENTS FOR THE YEAR ENDED 31st DECEMBER, 1966

(Figures adjusted to nearest $1)

Year 1965	Receipts			Year 1965	Payments			
	Subscriptions Received—				Victorian Naturalist—			
$68	Arrears	$225		$2,570	Printing	$3,600		
3,266	Current	4,449		482	Illustrating	766		
162	Supporting	109		172	Despatching	399		
				—	Editorial Expenses	14		
3,496			$4,783					$4,779
294	Sale of Victorian Naturalists		212		Working Expenses—			
120	Advertisements in Victorian Naturalist		245	70	Postage and Telephone	99		
	Interest Received—			66	Printing and Stationery	136		
2	Library Fund	5		10	Library Expenses	1		
98	Bank Account	144		36	General Expenses	52		
104	Investment of M. Wright Legacy	208		26	Rent of room for storage	40		
			357	116	Affiliation Fees, Subscriptions and Donations	36		
128	Surplus from Excursions		210	12	Preston Junior Naturalists Club Rent	16		
22	Sundry Income		13	22	Natural History Medallion expenses	30		
160	Amount transferred from Building Fund Account for payment of rent		202	—	Mammal Survey Group Expenses	15		
					less from Ingram Trust Grant	15		
						—		
				118	Typing and clerical assistance		121	
								531
				160	Rent of Hall and Library			202
				564	Surplus for the year			510
$4,424			$6,022	$4,424				$6,022

FIELD NATURALISTS' CLUB OF VICTORIA

BUILDING FUND

Amount of Fund at 31 December, 1965	$3,280
Interest on Investments and from Bank Account for year	166
	3,446
Less amount transferred to General Account for payment of rent	202
Amount of Fund at 31 December, 1966 as per Balance Sheet	$3,244

PUBLICATIONS FUND

Amount of Fund at 31 December, 1965	$3,665
Surplus for period from—	
Ferns of Victoria and Tasmania	42
Victorian Toadstools and Mushrooms	44
Vegetation of Wyperfeld National Park	119
Interest on Special Bonds and on Bank Account	71
Premium on conversion of Special Bonds 1/10/66	24
	3,965
Less Interest paid Wyperfeld Book Loans	19
Amount of Fund at 31 December, 1966, as per Balance Sheet	$3,946

NOTE: Loans were repaid 14/6/1966.

CLUB IMPROVEMENT ACCOUNT

Amount of Account at 31 December, 1965	$334
Donations	13
	347
Cost of new books and periodicals purchased for Library	158
Amount of Account at 31 December, 1966 as per Balance Sheet	$189

Subscriptions Now Due

Membership fees and subscriptions to the *Naturalist* for the year 1967 were due for renewal by 1 January. If you will not be paying your fees at one of the forthcoming general meetings, please remit them by post. Receipts will not be sent for payments by cheque unless requested.

This procedure will save office-bearers time, and expense, in sending out reminder notices.

Some Revision in Antechinus (Marsupialia)—2

By N. A. WAKEFIELD* and R. M. WARNEKE**

SUMMARY

Antechinus stuartii is recognized as a species distinct from *A. flavipes*, and the taxonomy of the two is reviewed. It is shown that, in recent literature, the name *A. flavipes flavipes* has been misapplied to *A. stuartii*. A neotype is designated for *A. stuartii*.

Plastic and cranial characters of major populations of these species and of *A. godmani* are examined and compared statistically. The distribution of each is mapped.

A. flavipes flavipes, of temperate eastern Australia, and *A. f. leucogaster*, of south-western Australia, are animals of open dry sclerophyll forests, but two populations of the species in tropical Queensland are restricted to rainforest habitats.

A. stuartii stuartii occurs in dense dry sclerophyll and wet sclerophyll forests of the Eastern Highlands and coastal areas of south-eastern Australia. This habitat is essentially adjacent to that of *A. flavipes flavipes*, but the two species are sympatric in some places. The tropical race "*adustus*" belongs, not to *A. flavipes* but to *A. stuartii*.

An appendix shows a revised distribution of *Antechinus minimus maritimus*.

Taxonomy is revised as follows:

ANTECHINUS FLAVIPES

Antechinus flavipes flavipes

(*Phascogale flavipes* Waterhouse, 1837; north of Hunter River, New South Wales.)

South-eastern Queensland, New South Wales, Victoria, south-eastern South Australia.

(Subjective synonym: *Phascogale rufogaster* Gray, 1841; South Australia.)

Antechinus flavipes leucogaster

(*Phascogale leucogaster* Gray, 1841; Canning River, Western Australia.)

South-western Western Australia.

Antechinus flavipes, populations of uncertain taxonomy.

North-east Queensland; Cape York Peninsula.

ANTECHINUS STUARTII

Antechinus stuartii stuartii

(*Antechinus stuartii* Macleay, 1841; Manly, New South Wales. Neotype: Waterfall, National Park, New South Wales.)

South-eastern Queensland, New South Wales, Victoria.

(Subjective synonyms: *Antechinus unicolor* Gould, 1854; Sydney, New South Wales. *Antechinus flavipes burrelli* Le Souef and Burrell, 1926; Ebor, north-eastern New South Wales.)

Antechinus stuartii adustus

(*Phascogale flavipes adusta* Thomas, 1923; Ravenshoe, north-eastern Queensland.)

North-eastern Queensland.

I. MATERIALS AND METHODS

(a) *Sources*

The sources of specimens and data are as follows:

American Museum of Natural History. (AMNH)

Australian Museum Sydney. (AM)

British Museum (Natural History). (BM)

Department of Zoology and Comparative Physiology, Monash University.

Division of Wildlife Research, C.S.I.R.O., Canberra.

Fisheries and Wildlife Department, Melbourne. (FWD)

Museum of Comparative Zoology, Harvard.

* Department of Zoology and Comparative Physiology, Monash University, Clayton, Victoria.

** Fisheries and Wildlife Department, Victoria.

National Museum of Victoria. (NMV)
Queensland Institute of Medical Research.
Queensland Museum, Brisbane.
Smithsonian Institution, United States National Museum.
South Australian Museum, Adelaide.
Western Australian Museum, Perth.

Although *Antechinus flavipes* and *A. stuartii* are widely distributed in eastern Australia and are abundant in areas of favourable habitat, both species are poorly represented in most museum collections. Of a total of about 250 specimens of *A. flavipes* and 400 specimens of *A. stuartii* examined, almost half are in the Fisheries and Wildlife Department collection.

In the course of the study, a programme of field observation and trapping was carried out, and, unless otherwise acknowledged, the details of habitat, set out in Sections III and VIII, are based on observations made by us in the course of that field work.

The other species dealt with in this paper, *A. godmani*, is known only from a small area in Queensland, and of the 37 specimens examined by us only 4 were available in Australian museums.

(b) *Characters examined and techniques of measurement*

The morphological features investigated and the techniques of measurement used were discussed in the previous paper of this series (Wakefield and Warneke, 1963). They are, in brief, as follows:

Characters examined

Size of body and appendages.
Size and morphology of the skull and teeth.
Characters of the pelage.
Characters of the feet.
External changes associated with breeding.

Techniques of measurement

Measurements of the body were taken using a measuring board, vernier calipers and a steel tape. The tail was measured from the cloaca; the pes from the heel to the tip of the longest toe, excluding the claw; and the ear from the tragoid notch to the tip.

While these techniques were used for all specimens in the Fisheries and Wildlife Department collection, they may not have been precisely the same as those used for measurements recorded with specimens from other institutions.

Figure 1 shows the seven measurements taken of the skull and dentition. The instruments used were either a HELIOS dial-reading or vernier calipers calibrated to 0.1 mm., and the measurements were taken with the aid of a binocular microscope at 6 to 10 magnifications. All cranial measurements recorded in this paper (except Thomas's of *A. godmani*) were made by this technique, and are recorded to the nearest 0·05 mm.

Specimens with milk teeth (deciduous fourth premolars) or in which the subsequent permanent premolars were not fully erupted were excluded from the tables of measurements.

(c) *Statistical analysis*

The "t" test, as outlined in Karmel (1959), was used for the comparisons, and the values of P were obtained from the statistical tables of Fisher and Yates (1957). Results are expressed in terms of the highest probability level exceeded (e.g. $P<0{\cdot}02$) of the range of probability levels 0·10, 0·05, 0·02, 0·01 and 0·001.

II. TAXONOMY OF ANTECHINUS FLAVIPES

The species was described by Waterhouse (1838) as *Phascogale flavipes*,

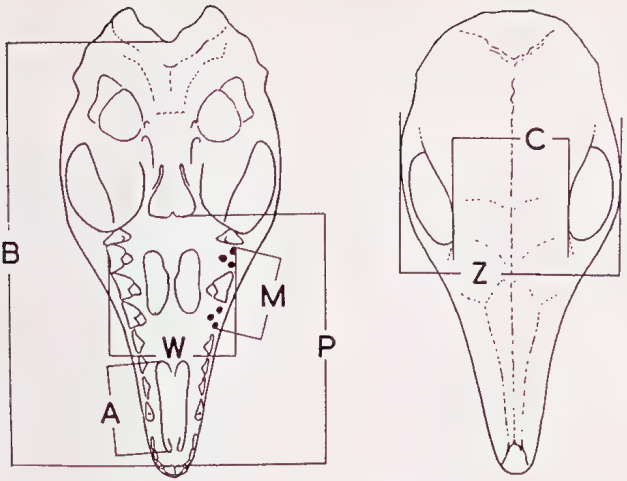


Fig. 1.
Skull measurements.
B—Basalar Length
Z—Zygomatic Width
C—Postorbital Constriction
P—Palatalar Length
A—Anterior Palatine Foramen
M—Alveolar Length M^{1-3}
W—Breadth at M^3

and the type, from "north of Hunter River, N.S.W.", is in the BM., No. 55.12.24.75 (skin and skull).

In recent literature—for example, Iredale and Troughton (1934) and Tate (1947: 127)—what we now regard as *Antechinus stuartii* (Sections VII-XI) has been identified as *A. flavipes flavipes*. But measurements and other details of the type specimen (communicated to us by R. E. Hill*), and Waterhouse's original description, identify the nominate form of *A. flavipes* according to our treatment of it in Sections III-VI.

Gray (1841) described a specimen from "Adelaide, South Australia" (BM. No. 41.1251; Skin and skull) as *Phascogale rufogaster*. Based on this, the trinomial *Antechinus flavipes rufogaster* has been used (Iredale and Troughton, *loc. cit.*; *et al.*) for a South Australian population of *A. flavipes*.

Gould (1863) did not confuse *A. flavipes* with *A. stuartii*. Of *A. flavipes* he stated: "I have observed it to be very abundant both in New South Wales and in South Australia", and remarked that "specimens from both countries presented little or no difference in size or colour". Our studies confirm this observation (Sections IV and V); the epithets *rufogaster* and *flavipes* apply to the one geographical race (Figure 2), and we regard *rufogaster* as a subjective synonym of *A. flavipes flavipes*.

Gray (*loc. cit.*) described another specimen, from "Canning River, Western Australia" (BM. No. 41.1244), as *Phascogale leucogaster*. This represents a population that is currently recognized (Iredale and Troughton, *loc. cit.*) as *A. flavipes leucogaster*. It is geographically isolated (Figure 2), and our comparisons (Sections III and IV) indicate that this subspecific status is justified.

While there has been sufficient material available to provide a reasonably clear picture of *A. flavipes* in the temperate region, the relatively few specimens available from northern Australia have allowed no such clarification of the status of its tropical populations. The population of North-east Queensland probably warrants separate subspecific status, and that of Cape York certainly does. Correct taxonomic procedure in the latter case will not be clear until ample comparative material

* Mammal Department, British Museum (Natural History).

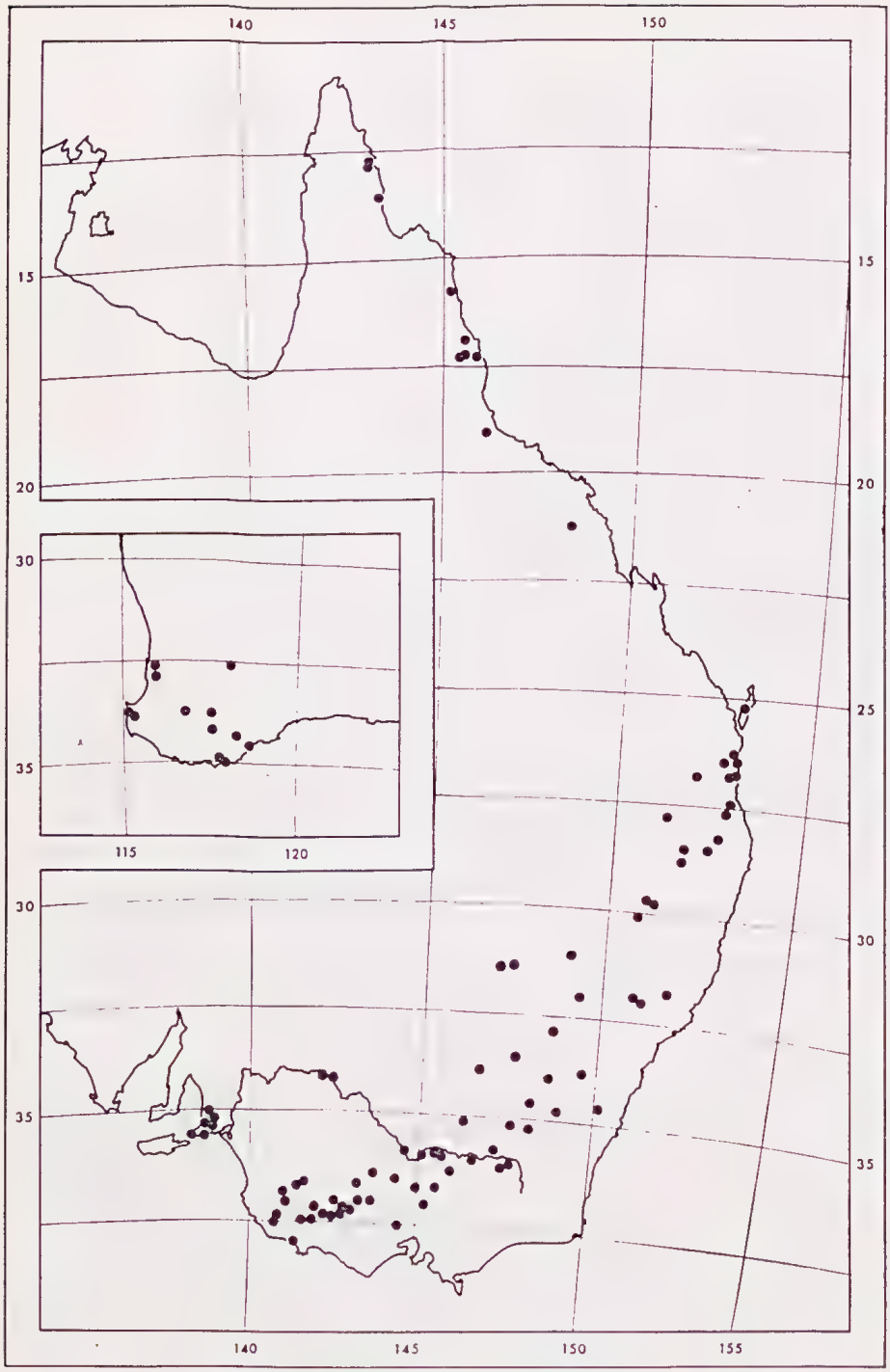


Fig. 2. Distribution of *Antechinus flavipes*.

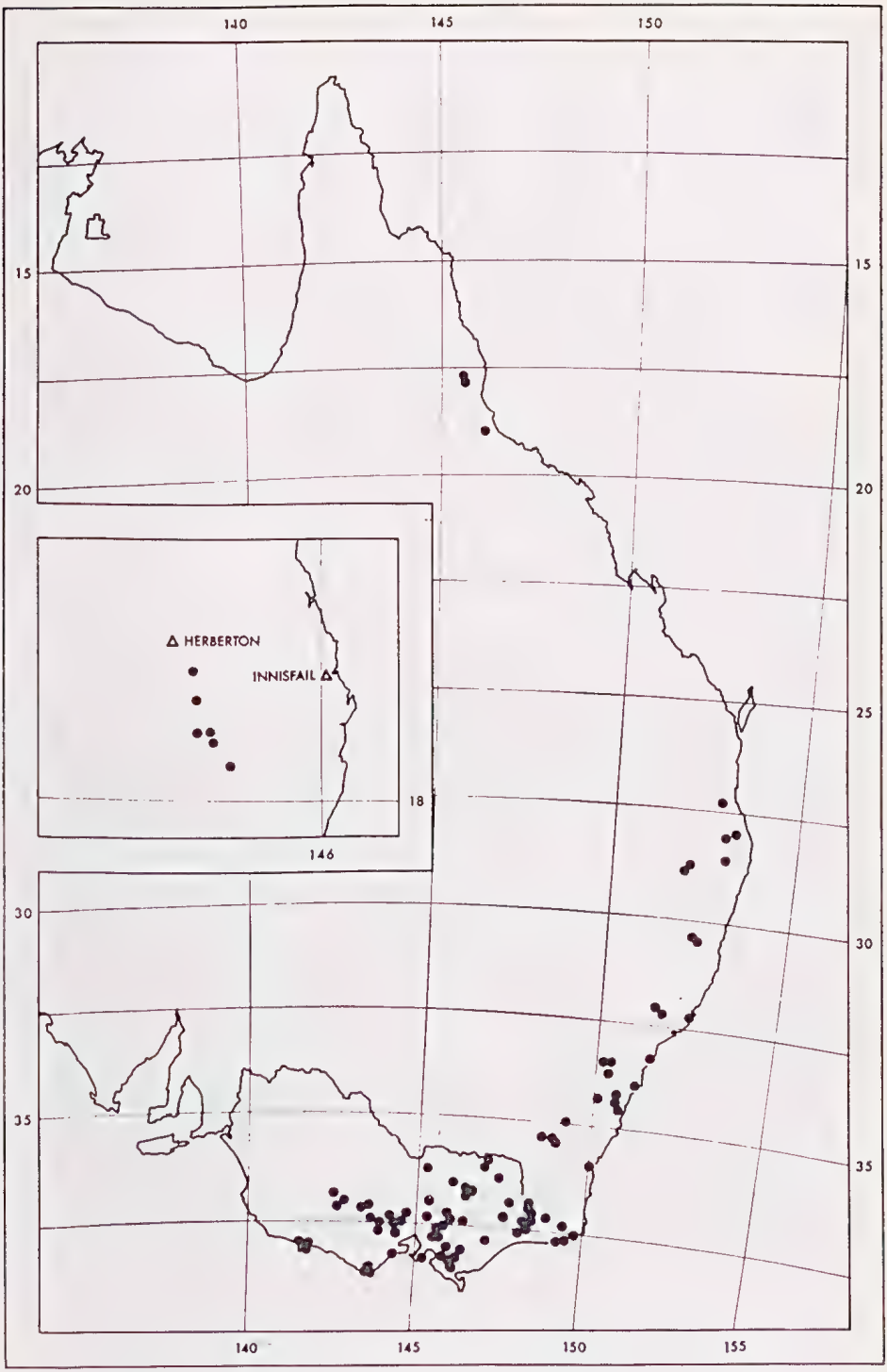


Fig. 3. Distribution of *Antechinus stuartii*, and (inset) of *A. godmani*.

is available of the Arnhem Land animal which Thomas (1904) named *Phascogale bella.*

(The names *Antechinus unicolor, A. flavipes burrelli* and *A. flavipes adustus* are excluded from the synonymy of *A. flavipes*; they belong to that of *A. stuartii* (Section VII).)

III. DISTRIBUTION AND HABITAT OF ANTECHINUS FLAVIPES

The main population, which comprises the nominate race, *A.f. flavipes,* is found in south-eastern Queensland, eastern New South Wales, Victoria and south-eastern South Australia (Figure 2). It is mainly on the inland side of the Great Dividing Range but is near-coastal at both the northern and south-western extremities of its distribution.

The habitat is fairly open forest, mainly in areas of rainfall between 15 and 25 inches per annum. According to the classification of Wood and Williams (1960), the areas occupied are partly dry sclerophyll forest and partly woodland.

Krefft (1866) reported *A. flavipes* as abundant in 1857 in the woodlands of Black Box (*Eucalyptus bicolor*) and Red Gum (*E. camaldulensis*) of the Murray River flood plains, from Echuca to Mildura. Its distribution along that river evidently linked the Adelaide-Mount Lofty Range population with that of Victoria and New South Wales.

At least in Victoria, most trees with which the species is associated are fibrous-barked eucalypts, either "box" species or "stringy-barks". Food, comprising insects mainly, is obtained from the trunks and large limbs of these trees and about logs. The animals are almost wholly nocturnal and crepuscular, but individuals are occasionally seen abroad in full daylight.

Homes, for daytime refuge, are normally hollow logs and hollow trunks of trees. Specimens caught at Glenlofty (western Victoria) were living in the trunk of a Red Stringybark (*Eucalyptus macrorrhyncha*), with Yellow Box (*E. melliodora*) and Long-leaf Box (*E. goniocalyx*) in association as well as scattered logs and a sparse ground cover of saw-sedge (*Gahnia radula*) and tussock grass (*Poa*) (Figure 4). In the lower Glenelg district (south-western Victoria) the habitat was Brown Stringybark (*E. baxteri*) and Messmate (*E. obliqua*), with a few logs and an abundance of bracken (*Pteridium esculentum*) and tussock grass. In the Grampians (western Victoria) the species commonly occupies crevices in sandstone cliffs, and along the lower Glenelg River it occasionally inhabits holes in limestone outcrops.

The Western Australian race, *A.f. leucogaster,* is recorded mainly from forests of Jarrah (*Eucalyptus marginata*) and Tuart (*E. gomphocephala*), in the Perth-Blackwood-Albany area.

The habitats of both the North-east Queensland population and that of Cape York Peninsula are tropical rainforests. The former is recorded from Mount Finnegan, Speewah, Russell River and Innisfail; the latter is from McIlwraith Range (Rocky Scrub), Tozer Range, Iron Range and upper Nesbit River. The habitat of each of these localities has been described by Brass, (1953).

IV. PLASTIC CHARACTERS OF ANTECHINUS FLAVIPES

Both Jones (1923) and Finlayson (1958), using South Australian material and thus avoiding confusion with *A. stuartii,* have given accurate accounts of *A. f. flavipes* (under the synonym, however, of *A. f. rufogaster*). Taken together, their notes provide a very detailed description of the external morphology of the form.

A. flavipes is a lithe, compactly built animal of shrew-like rather than murine form. The tail is shorter than the head-body length and is not incrassated. The ears, thin in substance, are comparatively large and conspicuous when fully erect but may be folded against the head when the animal is alarmed. The pes, like those of squirrels (Sciuridae), are capable of a considerable degree of rotation, which, together with the prominent and strongly ridged pads on the manus and pes, are features of other members of the Dasyuridae with pronounced scansorial habits.

In the past, much emphasis has been placed on plastic characters in the description of subspecies. The variation observed and measured in each of the geographically isolated populations of *A. flavipes*, as shown in Figure 2, is given below.

(a) *Body measurements*

Details of body measurements, and of numbers of specimens from which these were taken, are set out in Tables 1-4. The figures for *A. f. flavipes* do not include data of any Queensland specimens, but apply only to material from New South Wales, Victoria and South Australia.

In these tables, the average figures for tail, ear and pes lengths have been expressed as percentages of head-body length. These percentages indicate that body proportions are essentially the same for each of the eastern Australian series, as well as for the two sexes within each series.

For most of the specimens from North-east Queensland and Cape York (i.e. those in the AMNH), the ear had been measured from the crown, instead of the tragoid notch. In several instances both measurements were recorded,

Fig. 4. Habitat of *Antechinus flavipes* and *A. stuartii*, Glenlofty, Victoria.

TABLE 1

Body measurements of *Antechinus flavipes flavipes* (south-eastern Australia)
Measurements in millimetres

		Range	Mean±S.E.	Standard deviation
Head–body	23 ♂♂	101 –135	116·2±2·46	11·80
	16 ♀♀	94 –120	107·9±2·14	8·57
Tail	23 ♂♂	70 –112	95·0±2·44 *(82%)	11·72
	18 ♀♀	78 – 96	86·9±1·09 (81%)	4·65
Ear	23 ♂♂	14·5– 21	18·9±0·39 (16%)	1·86
	18 ♀♀	13 – 20	17·5±0·41 (16%)	1·72
Pes	25 ♂♂	18 – 22	20·4±0·21 (18%)	1·04
	18 ♀♀	17 – 20	18·7±0·24 (17%)	1·02

* Per cent of head–body length.

TABLE 2

Body measurements of *Antechinus flavipes leucogaster* (south-western Australia)
Measurements in millimetres

		Range	Mean±S.E.	Standard deviation
Head–body	4 ♂♂	100 –108	105·3±1·87	3·74
	9 ♀♀	86 –104	94·9±1·77	5·30
Tail	4 ♂♂	73 – 94	85·3±4·44 *(81%)	8·87
	9 ♀♀	65 – 80	73·1±1·49 (77%)	4·46
Ear	4 ♂♂	17 – 18	17·3±0·25 (16%)	0·50
	9 ♀♀	15 – 18	16·3±0·66 (17%)	1·97
Pes	4 ♂♂	18 – 20	19·3±0·48 (18%)	0·96
	9 ♀♀	16 – 18	16·8±0·22 (18%)	0·67

* Per cent of head–body length.

and these, together with "notch" measurements for the remainder of the series, indicate that the difference between the two is of the order of 5 mm. For the sake of uniformity "crown" measurements were converted to "notch" by the addition of this length.

Sexual dismorphism of the order of about 8 per cent is apparent in all linear measurements save that of ear length, but sufficient data for statistical evaluation were available only in the case of *A. f. flavipes* and the Cape York form of the species. In both forms the difference in pes length was statistically significant, with $P<0{\cdot}001$ in both cases. In head-body and tail length, Cape York males were significantly larger than females ($P<0{\cdot}001$) but in the tests of *A. f. flavipes* the highest probability levels exceeded were only 0·02 and 0·01 respectively.

From the tables it can be seen that the Cape York form is approximately

TABLE 3

Body measurements of *Antechinus flavipes* from North-east Queensland
Measurements in millimetres

		Range	Mean±S.E.	Standard deviation
Head–body	5 ♂♂	121 –145	131·0±4·03	9·03
	8 ♀♀	108 –136	119·4±3·79	10·72
Tail	5 ♂♂	100 –114	107·2±2·39 *(82%)	5·36
	8 ♀♀	83 –105	93·5±3·13 (78%)	8·86
†Ear	5 ♂♂	19 – 21	19·4±0·40 (15%)	0·90
	7 ♀♀	16 – 19	17·3±0·60 (15%)	1·60
Pes	5 ♂♂	21 – 24	22·6±0·59 (17%)	1·33
	8 ♀♀	19 – 23	20·9±0·45 (18%)	1·27

* Per cent of head–body length.
† "Crown" measurement +5 mm.

TABLE 4

Body measurements of *Antechinus flavipes* from Cape York Peninsula, Queensland
Measurements in millimetres

		Range	Mean±S.E.	Standard deviation
Head–body	40 ♂♂	118 –154	140·0±1·03	6·57
	27 ♀♀	108 –140	122·4±1·52	7·92
Tail	40 ♂♂	101 –133	118·8±1·00 *(85%)	6·33
	26 ♀♀	91 –110	100·7±0·87 (82%)	4·46
†Ear	39 ♂♂	16 – 20	18·1±0·16 (13%)	0·97
	25 ♀♀	16 – 19	18·0±0·17 (15%)	0·87
Pes	40 ♂♂	23·5– 27	25·0±0·15 (18%)	0·93
	25 ♀♀	21 – 24	22·4±0·18 (18%)	0·92

* Per cent of head–body length.
† "Crown" measurement +5 mm.

20 per cent longer in head-body, tail and pes length than is *A. f. flavipes*. The data on the North-east Queensland form are less reliable, but they indicate that it is intermediate in size between the Cape York form and *A. f. flavipes*. As the figures for *A. f. leucogaster* show it to be about 10 per cent small r than *A. f. flavipes*, it is apparent that a well-defined clinal gradient in body size exists, with the largest form at the northern extremity and the smallest form at the south-western extremity of the species' arc-like range.

(b) *Manus and pes*

The normal appearance of the palmar and plantar surfaces of the feet of *A. flavipes* is shown in Figure 5. In all specimens examined the first interdigital (pollical) and inner metacarpal pads on the manus were well

TABLE 5

Fusion of first interdigital pad with inner metacarpal pad on manus and with inner metatarsal pad on pes in *Antechinus flavipes*, *A. stuartii* and *A. godmani*

	Fusion on both feet		Fusion on one foot		Fusion on neither foot	
	N	%	N	%	N	%
flavipes (manus)	—	—	—	—	21	100
stuartii „	—	—	3	3	98	97
godmani „	—	—	—	—	26	100
flavipes (pes)	1	5	1	5	19	90
stuartii „	78	77	13	13	10	10
godmani „	11	42	4	16	11	42

separated, but in Jones (1923: 96) an illustration of the palm of *A. f. flavipes* shows the inner metacarpal lacking or fused with the first interdigital. This is apparently a rare occurrence.

In Figure 5 the inner metatarsal pad of the pes is shown distinctly separate from the first interdigital pad (hallucal). However in some specimens these pads were in contact or, more rarely, fused (see Table 5). This latter condition was noted on the pes of two specimens from Victoria.

In *A. flavipes* the granulations on the palm and sole are not pigmented as in *A. swainsonii* (see Wakefield and Warneke, 1963: 202) and are therefore less obvious. However in most specimens of *A. flavipes* we have seen, several conspicuously large granules were noted between the outer metatarsal pad and the heel, as can be seen in Figure 5. In most cases there were two, in others none, one or three.

(c) *Pelage*

A. flavipes flavipes. The main pile is dense and moderately soft, but a profusion of long, coarse guard hairs imparts a rather crisp texture to the coat. There is marked antero-posterior differentiation in dorsal colour: the head and foreparts are dark grizzled grey and the lower back and rump are suffused with buff or reddish fawn. This toning is a composite effect due to an intermingling of several discrete colours in the fur. The dominant colour of the main pile is confined to a broad band between a basal zone of deep slate grey and an extreme terminal zone of dark brown to black; it is white on the head and shoulders and a rich ochraceous buff on the rump. A grizzled effect is produced by the interspersed guard hairs which are wholly black or tipped with light brown.

The flanks, ventrum and inner side of the limbs are in marked contrast, as guard hairs are lacking and the colour in the fur (ochraceous buff to golden tan) extends from the basal zone of slate grey right to the tip of each hair. The inguinal and gular areas are less brightly coloured.

Orbital crescents of light buff, and a patch of buff fur at the base and to the back of each ear, are very conspicuous. The ears are sparsely clothed with short adpressed buff hairs, some at the lower part of the conch being dark terminally. The dorsal surfaces of manus and pes are buff to ochraceous buff, undiluted by darker elements.

The tail is clothed with short ad-

pressed hairs which tend to mask rings of small epidermal scales underneath. Above it is buff, grizzled with black, becoming wholly black at the apex where the hairs are noticeably longer. Below it is deep buff, darkening towards the apex.

These notes on the pelage of *A. flavipes flavipes* were compiled after examination of a large series of skins from South Australia, Victoria, New South Wales and south-eastern Queensland. For the most part these specimens agreed well with descriptions of both the type, from north-eastern New South Wales (Waterhouse, 1838), and the South Australian population (Jones, 1923: 95-6; and Fin-

Fig. 5. Foot characters of *Antechinus flavipes*.
Left—Left pes. *Lower right*—Left manus. *Upper right*—Foreclaws.

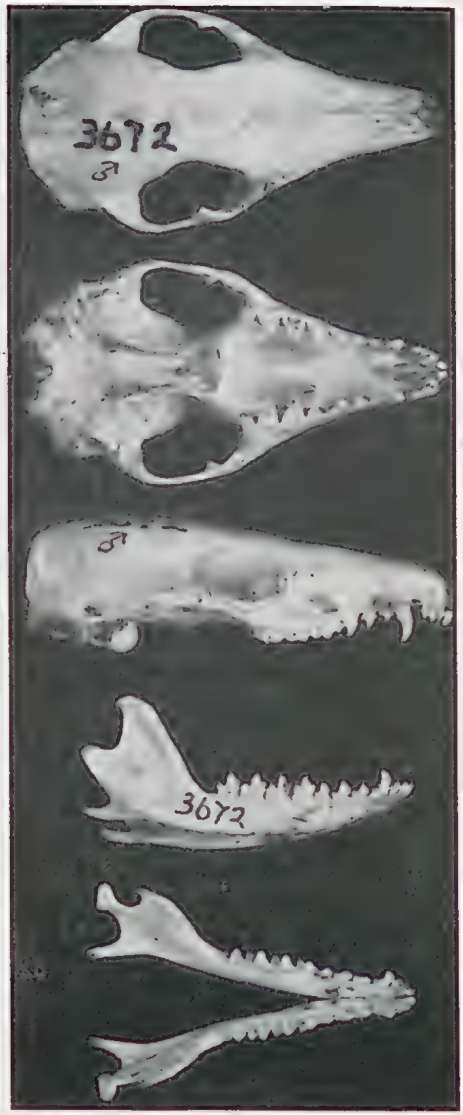
layson, 1958: 145). However, in certain localities variants do occur, but only to the extent of a reduced intensity of the colour of the lower back, flanks and ventrum, to a pale buff. This was noted in single specimens from various localities and in whole series from certain Queensland localities: Imbil (26°28′ S., 152°41′ E.), Barney View (28°15′ S., 152°47′ E.), and Frazer Island (at about 25° S.) off the coast.

Photos: *J. Cooper, FWD.*

Fig. 6. Skull and mandible of an adult male *Antechinus flavipes flavipes* from Frazer Island, S.E. Queensland. (Queensl. Mus., No. J.11258).

Fig. 7. Skull and mandible of an adult female *Antechinus flavipes leucogaster* from Kalamunda, W. Aust. (FWD, No. D.642).

A. flavipes leucogaster. In the Western Australian animal the bright ochraceous tonings of the typical form are replaced by a subdued and sombre ochraceous brown. However, the physical components of the pelage and the pattern of colours are essentially the same in all respects save one; the ochraceous brown of the flanks does not extend across the ventrum. In ventral aspects, white-tipped fur extends from the gular to the in-



Photos: *J. Cooper, FWD.*

Fig. 8. Skull and mandible of the neotype of *Antechinus stuartii stuartii*, an adult male from Waterfall, National Park, N.S.W. (AM, No. M.5294).

Fig. 9. Skull and mandible of an adult male *Antechinus godmani* from Evelyn, N. Queensland (Queensl. Mus., No. J.3672).

TABLE 6

Cranial measurements of *Antechinus flavipes flavipes*
Measurements in millimetres

		Range	Mean±S.E.	Standard Deviation
Basalar length (B.L.)	45 ♂♂	25·75–30·80	28·09±0·21	1·408
	26 ♀♀	23·45–28·20	25·80 0·17	0·866
Zygomatic breadth (Z.B.)	48 ♂♂	16·15–20·40	18·34±0·15	1·032
	28 ♀♀	15·75–18·35	16·81 0·12	0·620
Postorbital constriction (P.C.)	49 ♂♂	5·90– 7·05	6·52±0·04	0·273
	30 ♀♀	5·95– 7·20	6·36 0·05	0·291
Palatalar length (P.L.)	50 ♂♂	13·80–16·80	15·29±0·11	0·761
	30 ♀♀	12·75–15·30	14·24 0·09	0·510
Anterior palatine foramen	50 ♂♂	2·25– 3·70	2·89±0·04	0·294
	29 ♀♀	2·25– 3·05	2·71 0·05	0·250
Breadth at M^3 (B.M.)	50 ♂♂	9·45–11·10	10·27±0·06	0·422
	30 ♀♀	9·10–10·60	9·80 0·06	0·334
Length, M^{1-3}	51 ♂♂	5·40– 6·50	5·87±0·03	0·210
	34 ♀♀	5·30– 6·20	5·70 0·05	0·304
P.C./B.L., as per cent	42 ♂♂	19·6 –25·6	23·2 ±0·21	1·33
	26 ♀♀	22·4 –26·6	25·4 0·32	1·63
Z.B./B.L., as per cent	43 ♂♂	62·1 –68·7	65·3 ±0·25	1·60
	25 ♀♀	61·9 –67·4	64·9 0·35	1·78
P.L./B.L., as per cent	43 ♂♂	52·4 –56·7	54·4 ±0·14	0·92
	26 ♀♀	52·6 –57·7	55·0 0·23	1·19
B.M./B.L., as per cent	44 ♂♂	34·0 –39·0	36·7 ±0·17	1·11
	26 ♀♀	34·8 –40·0	38·0 0·23	1·16
P.C./Z.B., as per cent	48 ♂♂	30·8 –39·2	35·6 ±0·30	2·06
	28 ♀♀	34·8 –41·2	37·8 0·30	1·58

guinal region and onto the inner side of the limbs. The whiteness is variably modified by the basal colour of slate grey showing through.

North-east Queensland series. The dorsal colour pattern of specimens from this region is the same as that of *A. f. flavipes*, with strong antero-posterior differentiation and overtones of black due to the guard hairs. The head and shoulders are dark, lightly tinged with brownish buff, and the lower back and rump are a warm rust brown. The latter colour is especially bright on the flanks where the guard hairs are lacking, but on the ventrum it is much reduced in intensity and is further diluted by a grey undertone due to a basal zone of slate grey.

Orbital crescents and ear patches of brown or brownish buff are inconspicuous in some specimens. The dorsal surface of both manus and pes is brownish buff. The tail is darker above as in the typical form but with darker tones of brown corresponding with those of the body fur, and is dark brown to black at the apex.

Cape York series. The pelage of specimens from this region is quite distinct. The pile is of shorter length and is more coarse than that of *A. f. flavipes* even though the guard hairs are less strongly developed, and be-

TABLE 7

Cranial measurements of *Antechinus flavipes leucogaster*
Measurements in millimetres

		Range	Mean±S.E.	Standard deviation
Basalar length (B.L.)	8 ♂♂	25·50–27·70	26·56±0·30	0·846
	10 ♀♀	23·40–26·55	24·79 0·28	0·886
Zygomatic breadth (Z.B.)	9 ♂♂	16·00–19·50	17·40±0·33	0·984
	10 ♀♀	14·70–17·40	15·83 0·25	0·794
Postorbital constriction (P.C.)	10 ♂♂	5·85– 6·60	6·32±0·09	0·270
	13 ♀♀	5·80– 6·30	6·15 0·04	0·143
Palatalar length (P.L.)	11 ♂♂	13·75–15·00	14·40±0·13	0·414
	12 ♀♀	13·00–14·55	13·58 0·11	0·374
Anterior palatine foramen	13 ♂♂	2·50– 3·10	2·82±0·05	0·195
	16 ♀♀	2·20– 3·25	2·65 0·07	0·286
Breadth at M^3 (B.M.)	11 ♂♂	9·30–10·20	9·68±0·08	0·276
	12 ♀♀	8·75– 9·65	9·20 0·08	0·284
Length, M^{1-3}	11 ♂♂	5·20– 5·80	5·43±0·05	0·180
	13 ♀♀	5·15– 6·00	5·42 0·06	0·215
P.C./B.L., as per cent	8 ♂♂	22·9 –25·2	23·8 ±0·29	0·82
	10 ♀♀	23·7 –26·2	24·8 0·23	0·74
Z.B./B.L., as per cent	8 ♂♂	62·7 –70·4	65·3 ±0·82	2·33
	9 ♀♀	60·5 –65·5	63·3 0·62	1·86
P.L./B.L., as per cent	8 ♂♂	53·5 –55·4	54·3 ±0·24	0·67
	10 ♀♀	53·8 –55·5	54·9 0·16	0·51
B.M./B.L., as per cent	8 ♂♂	35·4 –37·6	36·5 ±0·31	0·86
	10 ♀♀	35·8 –39·1	37·0 0·36	1·29
P.C./Z.B., as per cent	9 ♂♂	33·3 –39·3	36·6 ±0·64	1·91
	10 ♀♀	36·2 –42·3	38·8 0·63	2·00

cause the guard hairs are not prominent the fur over the head and shoulders has not the cold tones which are characteristic of the southern and western forms already described; antero-posterior differentiation is slight and indistinct. The general appearance is of slightly grizzled pale brown over the whole dorsum, scarcely warmer with a tinge of rust brown on the rump, and pale brown on the flanks, ventrum and inner side of the limbs. The basal zone of the main pile is everywhere slate grey.

Orbital crescents are absent and ear patches are not differentiated, other than by the absence of darker elements which are present in the adjacent fur. The dorsal surface of both manus and pes is fawn. The colours of the upper and under surfaces of the tail correspond with the adjacent body fur, darkening to brown or occasionally black at the apex.

V. SKULL AND DENTITION OF ANTECHINUS FLAVIPES

For its size the skull is quite massively constructed; it is broad across the zygomatic region, is of moderate depth, and has a short conical rostrum (see Figures 6 and 7). Features of particular significance are the relatively narrow postorbital constriction (narrower in relation to zygomatic

breadth in mature animals than in the young), absence of postorbital processes, and short anterior palatine foramina. The alisphenoid bulla is inflated and rounded in form while the "mastoid" portion, which is almost entirely enclosed by the periotic, is scarcely so.

The teeth are robust and powerful. I^1 is at least twice the bulk of I^2, is cylindrical or very slightly flattened laterally, markedly proödont and separated from I^2 by a wide diastema. I^{2-4} are crowded together with their triangular crowns overlapping; $I^2>I^3>I^4$. The upper canine is a broad tapered peg, slightly curved. $P^4>P^3>P^1$, with P^4 at least twice the bulk of P^1. There is no metaconic projection at the rear of M^4. The lower incisors are semi-recumbent; $I_1>I_2>I_3$. The lower canine is short, with a distinct posterior basal ledge. $P_3>P_1>P_4$.

The deciduous premolar dP^4, which is lost early in life, is a tiny low-crowned molariform tooth with three roots. By comparison, dP_4 is even smaller, being less than half its bulk. It is similar to the permanent premolars in form but is proportionately broader at the base and has a much lower crown. It has two roots which may be either divergent or contiguous.

A summary of seven cranial measurements and five skull proportions of each of the four geographically isolated populations is set out in Tables 6-9. Using the "t" test, the three variants have been compared statistically with the typical form.

A. f. leucogaster. According to Tate (1947: 128) this is a "thoroughly good race with larger bullae and smaller teeth than any of the east Australian races". A cursory examination of the average values of the skull proportions in Table 7 is sufficient to show that *A. f. leucogaster* is virtually identical to *A. f. flavipes* in the form of the skull, but in all the linear measurements taken it is of smaller size. Most of these linear differences from the typical form are not of high statistical significance, but in the case of breadth at M^3 both male and female *A. f. leucogaster* are quite distinctly smaller than the typical form ($P<0{\cdot}001$ for both tests).

In all morphological features the dentition of the two forms is essentially the same.

North-east Queensland series. Again, the skull proportions of this form differ to only a minor degree from those of the typical form. From the few specimens measured, males average about the same size and females slightly larger in skull size than their southern counterparts. There is not, however, a skull measurement common to both sexes which sets the North-east Queensland form apart from *A. f. flavipes.*

Cape York series. Skulls from this region were the largest seen; the average dimensions of the female series exceeding, in most measurements, those of the series of *A. f. flavipes* males. The statistical significance of the lineal differences between these two forms were all of high order. On the other hand the two forms are closely similar in skull proportions. The greatest difference, in the proportion Z.B./B.L. (Table 9), does suggest that the Cape York form is narrower in the zygomatic region, but statistically this difference is not significant.

Sexual dismorphism. The most obvious sexual differences in the skull were those of length and width. In *A. f. flavipes, A. f. leucogaster* and in the Cape York form, differences in

PLATE 3

Comparison of *Antechinus stuartii* and *Antechinus flavipes*

Above: *A. stuartii*, ♂, Glenlofty, Victoria (FWD, No. DY.417).
Below: *A. flavipes*, ♂, near Nelson, Victoria (FWD, No. DY.409).

(Note: In the lower picture the normal grey component of face and back coloration has been rendered bluish by the photography.)

basalar length, palatalar length and zygomatic breadth were found to be of high statistical significance ($P<0{\cdot}001$), but in the small series from North-east Queensland no appreciable sexual dimorphism in the skull was demonstrated.

The length of the anterior palatine foramen was a remarkably constant feature between the sexes of each of the four populations. Postorbital constriction, molar row and breadth at M^3 are not influenced by sex to any marked degree, except in *A. f. flavipes* and *A. f. leucogaster* where males are significantly broader at M^3.

When *A. flavipes* is considered in terms of its distribution along the Eastern Highlands and west across southern Australia, several anatomical trends are apparent. The most obvious is skull size (length and breadth), the largest occurring in Cape York Peninsula and the smallest in south-western Western Australia. A second and related trend can be seen in the length of the tooth row (see also Tate, 1947: 126-7). The average alveolar length of M^{1-3} of the South Australian series examined by us was $5{\cdot}95 \pm 0{\cdot}04$ mm.

Tate (1947: 126), in discussing the *A. flavipes* group (in which he included *A. stuartii* and *A. godmani*), described an ascending gradient in relative bulla size from the Papuan region through north Queensland to south and finally south-western Australia. This slight trend was apparent in the complex of the four populations of *A. flavipes* examined in this paper (see Figures 6 and 7).

VI. BREEDING CONDITION OF ANTECHINUS FLAVIPES

Females. In the non-breeding condition the pouch area is scarcely differentiated, its site on the lower abdomen being indicated by a small patch of rather coarse hairs of a uniform light fawn colour. Nipple counts made on females in this condition are difficult and unreliable as the nipples are quite minute and do not project from the skin.

As breeding is restricted to a short period each year and the populations are low at that time, relatively few females showing signs of breeding activity are represented in museum collections and, unfortunately, not all of them are dated. However, those with reliable data indicate that in Victoria the young are born in early August (NMV. No. R.12784), while in north Queensland they are born between mid-August and early September (AMNH series). No data on the Western Australian population were available.

In Victoria, lactation continues through to mid-November at least, by which time the young are no longer carried by the mother (FWD. No. D.233). In this specimen the mammary area was large and conspicuous, being devoid of hair and stained reddish brown. Its lateral margins were marked by raised ridges of skin and anteriorly it was bordered by a conspicuous fringe of long reddish hairs. Six pairs of elongated nipples were arranged symmetrically, parallel to the lateral margins.

In *A. flavipes* the nipple number is variable. In the Western Australian form satisfactory counts were obtained from only two specimens, both of which had 10. In the typical form the number is 10 or 12, and either may be noted in females from the same locality. Only two reliable counts from North-east Queensland were available, both of which were 8. Counts made on Cape York females were of either 10 or 8 nipples, but most of the latter were recorded with a query.

TABLE 8

Cranial measurements of *Antechinus flavipes* from North-east Queensland
Measurements in millimetres

		Range	Mean±S.E.	Standard Deviation
Basalar length (B.L.)	9 ♂♂	25·95–31·35	28·29±0·50	1·490
	9 ♀♀	26·15–28·70	26·42 0·45	1·340
Zygomatic breadth (Z.B.)	9 ♂♂	17·00–19·60	18·37±0·28	0·835
	9 ♀♀	16·70–19·00	17·60 0·22	0·658
Postorbital constriction (P.C.)	9 ♂♂	6·50– 7·30	6·80±0·08	0·250
	10 ♀♀	6·00– 7·20	6·73 0·12	0·369
Palatalar length (P.L.)	9 ♂♂	13·90–17·05	15·25±0·33	0·984
	9 ♀♀	14·35–15·70	14·79 0·17	0·517
Anterior palatine foramen	9 ♂♂	2·40– 3·20	2·82±0·09	0·254
	10 ♀♀	2·40– 3·00	2·71 0·06	0·187
Breadth at M^3 (B.M.)	9 ♂♂	9·50–11·25	10·19±0·20	0·587
	9 ♀♀	9·85–10·90	10·40 0·12	0·359
Length, M^{1-3}	9 ♂♂	5·40– 6·20	5·86±0·11	0·315
	10 ♀♀	5·60– 6·50	5·98 0·09	0·279
P.C./B.L., as per cent	9 ♂♂	22·0 –25·8	24·1 ±0·37	1·12
	10 ♀♀	22·4 –27·0	24·5 0·66	1·15
Z.B./B.L., as per cent	9 ♂♂	61·6 –70·4	65·0 ±0·85	2·54
	10 ♀♀	62·0 –66·2	64·4 0·49	1·56
P.L./B.L., as per cent	9 ♂♂	52·2 –55·2	53·3 ±0·41	1·22
	10 ♀♀	53·2 –55·7	54·8 0·23	0·74
B.M./B.L., as per cent	9 ♂♂	34·1 –37·2	36·2 ±0·33	0·98
	10 ♀♀	36·0 –39·3	37·9 0·31	1·00
P.C./Z.B., as per cent	9 ♂♂	35·2 –39·4	37·1 ±0·53	1·60
	10 ♀♀	35·9 –40·7	38·1 0·43	1·48

Males. In other *Antechinus* dealt with by us (Wakefield and Warneke, 1963: 208), the only external sign of sexual maturity in males was the size of the testes, considerable enlargement occurring some weeks before pouch development in the females. Our observations on live Victorian specimens indicate that this is also the normal pattern of development in male *A. flavipes.*

VII. TAXONOMY OF ANTECHINUS STUARTII

Macleay (1841) published both the genus *Antechinus* and the specific epithet *stuartii* as novelties to describe a male specimen from Spring Cove (i.e. Manly), New South Wales. In the original diagnosis the number of upper incisors was given as 6, but this was later corrected by a note (Macleay, 1842) stating that the dental formula was the same as that of *Phascogale.*

The original description was made from the notes of "J. Stuart, Esq.", and it was stated that the specimen had been lost. However, Macleay's later note indicated that he had examined a (the?) skeleton. As recent endeavours to locate this skeleton in the Macleay Museum, Sydney, and elsewhere, have been unsuccessful,

TABLE 9

Cranial measurements of *Antechinus flavipes* from Cape York Peninsula, Queensland
Measurements in millimetres

		Range	Mean±S.E.	Standard Deviation
Basalar length (B.L.)	39 ♂♂	29·00–32·65	30·38±0·17	1·048
	20 ♀♀	26·75–29·50	28·14 0·18	0·787
Zygomatic breadth (Z.B.)	38 ♂♂	17·80–20·50	19·17±0·10	0·590
	21 ♀♀	16·60–18·85	17·67 0·15	0·704
Postorbital constriction (P.C.)	41 ♂♂	6·35– 7·35	6·90±0·03	0·217
	26 ♀♀	6·25– 7·20	6·72 0·04	0·212
Palatalar length (P.L.)	40 ♂♂	15·60–17·85	16·68±0·09	0·569
	27 ♀♀	14·90–16·50	15·52 0·06	0·326
Anterior palatine foramen	41 ♂♂	2·45– 3·55	3·00±0·05	0·298
	27 ♀♀	2·40– 3·55	2·90 0·05	0·266
Breadth at M^3 (B.M.)	40 ♂♂	10·25–11·70	10·91±0·05	0·290
	27 ♀♀	9·75–11·15	10·55 0·06	0·317
Length, M^{1-3}	42 ♂♂	5·85– 6·75	6·13±0·03	0·182
	28 ♀♀	5·80– 6·30	6·04 0·03	0·135
P.C./B.L., as per cent	39 ♂♂	20·0 –24·5	22·5 ±0·16	0·98
	20 ♀♀	22·5 –26·1	24·0 0·20	0·89
Z.B./B.L., as per cent	37 ♂♂	59·3 –66·0	62·8± 0·23	1·37
	17 ♀♀	60·8 –66·0	62·9 0·36	1·48
P.L./B.L., as per cent	39 ♂♂	52·8 –55·9	54·5 ±0·14	0·89
	20 ♀♀	53·0 –56·9	55·0 0·21	0·96
B.M./B.L., as per cent	38 ♂♂	33·2 –38·0	35·6 ±0·19	1·17
	20 ♀♀	36·4 –38·9	37·7 0·17	0·78
P.C./Z.B., as per cent	38 ♂♂	32·4 –38·5	35·9 ±0·23	1·44
	21 ♀♀	34·3 –41·4	38·3 0·41	1·88

we conclude that the type specimen is indeed lost.

As a neotype we have selected a male specimen in the Australian Museum, No. M5294 (spirit specimen and skull), collected at Waterfall, National Park, New South Wales, on August 7, 1932. Its measurements in mm. are as follows: head-body 101, tail 94, ear 17 and pes 18; of the skull: basalar length 26·30, zygomatic breadth 16·90, postorbital constriction 6·95, palatalar length 14·70, anterior palatine foramen 2·75, breadth at M^3 9·50, and length of M^{1-3} 5·50.

Our reasons for accepting that Macleay's *Antechinus stuartii* is, in fact, the species we treat as such in this paper, and not any other eastern New South Wales phascogalinid, are as follows:

1. The large size (total length 9½ inches) excludes members of the *murina-leucopus* group of *Sminthopsis,* and size together with the comparatively long tail ("cauda fere corporio longitudinem aequante") also excludes *S. crassicaudata.*
2. The pelage colour ("fulvus abdomine artubusque subtus albescentibus"), and the coastal habitat, exclude *Antechinus flavipes.*
3. The comparatively long tail excludes *Antechinus swainsonii.*

4. The tail features ("cauda teres pilosa gracilis") excludes *Phascogale tapoatafa.*

Gould (1854) described *Antechinus unicolor* from New South Wales (BM. No. 54,11.19.2). The plate is an accurate portrayal of the almost concolorous *Antechinus stuartii.* One of Gould's specimens, a female, like Macleay's original, is of greater size than any example of *A. stuartii* measured by us (see Table 10).

Le Souef and Burrell (1926) described *Antechinus flavipes burrelli* from Ebor, north-eastern New South Wales. The type specimens (AM. No. M.2593), and others from that locality, are of *A. stuartii,* and they do not demonstrate any feature which would justify subspecific status. Ebor is within the geographical range of what we regard as the nominate form of *A. stuartii* (see Figure 3); hence *"burrelli"* is treated as a subjective synonym of *A. stuartii stuartii.*

Iredale and Troughton (*loc. cit.*) misapplied the trinomial *Antechinus flavipes flavipes* to the central-eastern New South Wales population which is, in fact, the nominate form of *A. stuartii.* This error has been perpetuated in many subsequent publications dealing with that population (Troughton, 1941; Tate, 1947; Horner and Taylor, 1959; Marlow, 1961; etc.).

Thomas (1923) established the trinomial *Phascogale flavipes adusta* for specimens of *Antechinus* from Ravenshoe in the Atherton area of north-eastern Queensland. Measurements of these, communicated to us by R. E. Hill, including the type specimen (BM. No. 22.12.18.54), and the original diagnosis, show that *"adusta"* belongs, not to *A. flavipes,* but to *A. stuartii.* Thomas himself later realized that two species were involved, designating one *"flavipes"* and the other *"unicolor"* on his specimen labels; *"adusta"* he placed with *"unicolor"* (W. D. L. Ride*, *in litt.,* 12.x.1965).

Not having examined sufficient specimens of this tropical population of *A. stuartii,* we are unable to assess its status. The average body and cranial measurements of 5 males and of 2 females that are given in Table 12 at least demonstrate that it is comparable in size and form to *A. stuartii stuartii* (see Table 10). The population appears to be geographically isolated (see Figure 3) and can be distinguished as *A. stuartii adustus,* pending more knowledge of its morphology and distribution.

The distribution of *A. stuartii* overlaps that of *A. flavipes* in several areas. The two have been shown to be truly sympatric by the trapping of typical specimens of each at (a) Glenlofty, western Victoria (37°04′ S., 143°12′ E.), and (b) "Stoney Creek", midway between Murrumbateman and Gundaroo, south-eastern New South Wales (35°00′ S., 149°09′ E.), the latter by P. Woolley, A.N.U., Canberra. This evidence of reproductive isolation supports our action in recognizing the two forms as distinct species.

VIII. DISTRIBUTION AND HABITAT OF ANTECHINUS STUARTII

The nominate race, *A. s. stuartii,* extends from the extreme south-east of Queensland, through eastern New South Wales and eastern and central Victoria, to the extreme south-west of Victoria. In this area it occurs in the highlands about the Great Dividing Range and in the coastal tracts between the highlands and the sea.

Essentially, its area of distribution is on the coastal side of that of *A. f. flavipes*; the ranges of the two are complementary, with little overlap. On the other hand, the general range of

* Director, Western Australian Museum.

A. s. stuartii is practically the same as that of *A. swainsonii mimetes* (see Wakefield and Warneke, 1963, Figure 2), and these two are commonly sympatric.

A. s. stuartii occupies a comparatively wide variety of habitats within the general categories of wet sclerophyll forest and dry sclerophyll forest. Rainfall on these habitats ranges from about 25 to over 60 inches per annum, and the elevations are from sea level to at least 4500 feet. Our observations suggest that this species is the most abundant marsupial in south-eastern Australia.

At Loch Valley the rainfall is about 56 inches per annum, and the natural vegetation is a forest of White Mountain Ash (*Eucalyptus regnans*), with a mid-storey of Silver Wattle (*Acacia dealbata*) and some Myrtle Beech (*Nothofagus cunninghamii*), and a dense under-storey of shrubbery and ferns. In a similar habitat, in the Marysville area of east-central Victoria, several specimens were caught in traps placed about 20 feet above the ground on limbs of Silver Wattle trees.

Specimens of *A. stuartii* were found in a fairly open forest of Snow Gum (*Eucalyptus pauciflora*) at 4500 feet elevation, in the upper Buchan River area (eastern Victoria); they were identified as *A. flavipes* (Wakefield, 1960). In the same district, at about 3000 feet near Mount Seldomseen, examples were trapped in a dense forest of Broad-leaf Peppermint (*Eucalyptus dives*), Messmate (*E. obliqua*) and Silver Wattle, with numerous logs and much low shrubbery.

In coastal dune scrubs at Mallacoota (eastern Victoria) the main trees of the habitat are Gum Myrtle (*Angophora intermedia*), banksias (*Banksia integrifolia, B. marginata*), Bracelet Honey-myrtle (*Melaleuca armillaris*), with bracken and several shrub species of the heath family (*Epacridaceae*). In the same district, specimens were caught in runways of bush rats (*Rattus fuscipes assimilis*) in an area almost devoid of trees, under a dense ground cover of Spear Grasstree (*Xanthorrhoea hastilis*) and numerous sedge species (*Cyperaceae*) and grasses.

At Mount Clay near Portland (south-western Victoria) the habitat is fairly open forest of stringybark eucalypts (*E. baxteri, E. obliqua*) with fallen logs and a dense ground cover of bracken, Dwarf She-oak (*Casuarina*), flat-pea (*Platylobium*), Flame Heath (*Astroloma conostephioides*) and speargrass (*Stipa muelleri*). The population of *A. stuartii* in this general area was cited by Finlayson (1958) as the "Heathmere variant" of *A. flavipes*. In the Gorae Forest, west of Mount Clay, *A. stuartii* has been caught within 10 miles of the lower Glenelg habitat of *A. flavipes* (see Section III), but the ranges of the two species have not been found to overlap in this district.

In the Ballarat district (western Victoria), with a rainfall of 27 inches per annum, there is a comparatively pale variant of *A. stuartii* in forests of Narrow-leaf Peppermint (*E. radiata*) and Messmate, with a light ground cover of tussock-grass (*Poa*), some bracken and scattered clumps of Small Grasstree (*Xanthorrhoea minor*). Homes are made in hollow limbs and trunks of the peppermint trees, and many nests have been found in stacks of firewood that have been left in the bush for two or three years to dry. The nests are of leaves and bark.

The Glenlofty habitat, where *A. stuartii* and *A. flavipes* are sympatric, is described in Section III. A single specimen of *A. stuartii* was trapped there amongst tussock-grass and sawsedge (*Gahnia radula*) which provided a 50 per cent ground cover on a nar-

TABLE 10

Body measurements of *Antechinus stuartii stuartii* (total series)
Measurements in millimetres

		Range	Mean±S.E.	Standard Deviation
Head–body	123 ♂♂	77 –121	97·4±0·70	7·80
	63 ♀♀	74 –120	91·2 1·18	9·29
Tail	119 ♂♂	73 –109	94·1±0·73 *(97%)	7·99
	67 ♀♀	65 – 99	84·3 0·91 (92%)	7·50
Ear	109 ♂♂	13·5– 19	15·9±0·12 (16%)	1·28
	73 ♀♀	13·5– 19	15·9 0·18 (17%)	1·51
Pes	126 ♂♂	15·5– 19·5	17·9±0·08 (18%)	0·89
	78 ♀♀	14 – 20	16·9 0·12 (18%)	1·06

* Per cent of head–body length.

TABLE 11

Body measurements of *Antechinus stuartii stuartii* (Loch Valley series)
Measurements in millimetres

		Range	Mean±S.E.	Standard Deviation
Head–body	58 ♂♂	77 –107	95·3±0·85	6·49
	13 ♀♀	76 – 93	84·9 1·45	5·23
Tail	56 ♂♂	80 –108	98·0±0·75 *(103%)	5·64
	13 ♀♀	78 – 99	87·5 1·73 (103%)	6·23
Ear	58 ♂♂	13·5– 17	15·4±0·11 (16%)	0·87
	13 ♀♀	14 – 16·5	15·0 0·21 (18%)	0·75
Pes	58 ♂♂	16 – 19·5	17·7±0·13 (19%)	0·98
	13 ♀♀	15 – 17	16·1 0·23 (19%)	0·82

* Per cent of head–body length.

row strip of flat ground along a dry water course. It had a pale pelage typical of the Ballarat variant (see Plate). Specimens of *A. flavipes* were caught 65 yards to the south, 260 yards to the east, and about half a mile to the west and south respectively of the locus of the *A. stuartii* specimen, some in traps placed about logs within the margin of the sedge-grass flat. In addition to the eucalypts previously mentioned, the Candlebark Gum (*E. rubida*) occurred at that spot (Figure 4).

The Grampians population of *A. stuartii* is within the geographical range of *A. flavipes*, and both species are distributed generally in these mountains. A specimen of *A. stuartii* and one of *A. flavipes* were trapped at the same spot, about 2 miles west of Mount Frederick, but at different times.

Troughton (1941) gave details of *A. stuartii* inhabiting crevices in the sandstones of the Sydney area, though he identified it as *A. flavipes*, and he commented on the agility of the ani-

TABLE 12

Antechinus stuartii adustus: average body and cranial measurements of 5 males and of 2 females

Measurements in millimetres

	♂♂	♀♀		♂♂	♀♀
Head–body	109·2	100·0	Anterior palatine foramen	2·96	2·80
Tail	94·0	87·0	Breadth at M^3 (B.M.)	8·91	8·90
Ear	No data		Length, M^{1-3}	5·24	5·30
Pes	21·8	20·5	P.C./B.L., as per cent	26·3	26·8
Basalar length (B.L.)	25·25	24·50	Z.B./B.L., as per cent	61·9	62·4
Zygomatic breadth (Z.B.)	15·78	15·25	P.L./B.L., as per cent	54·5	55·3
Postorbital constriction (P.C.)	6·55	6·55	B.M./B.L., as per cent	35·3	36·3
Palatalar length (P.L.)	13·79	13·50	P.C./Z.B., as per cent	41·0	43·0

mals in running about on the walls and ceilings of caves. In Victoria, evidence of cliff occupancy by *A. stuartii* was provided by several specimens trapped at Murrindal (eastern Victoria) and one at Glen Aire on the Otway Peninsula (south-western Victoria), in both cases at limestone cliffs.

Wakefield (1954) commented on the climbing ability and speed of movement of *A. stuartii* (again as *A. flavipes*), and recorded several observations of individuals abroad in full daylight. The species is normally nocturnal and, like *A. flavipes*, its usual food is insects, obtained partly about tree trunks and limbs and partly about logs and amongst ground litter.

A. s. adustus is known only from Ravenshoe and near Townsville, in north-eastern Queensland, and it is presumably an animal of the tropical rainforests.

IX. PLASTIC CHARACTERS OF ANTECHINUS STUARTII

The general comments on *A. flavipes* at the beginning of Section IV apply equally well to *A. stuartii*, as the external differences between them, except in pelage colour, are not very obvious. In the following notes attention has been drawn to the major points of distinction by which *A. stuartii* can be recognized.

(a) *Body measurements*

The body measurements of a series of 123 males and 63 females are summarized in Table 10. Specimens from all parts of the species range are represented but the bulk of the series is from Loch Valley (38°00′ S., 145°33′ E.) in eastern Victoria. Details of the latter are included separately (Table 11) to show the variation in a relatively large sample from one locality.

It is apparent from these data that the body proportions of both sexes are similar and that males are larger than females in head-body, tail and pes length. This sexual dimorphism is of high statistical significance ($P<0·001$ in each case). If these same data are compared with those of *A. f. flavipes* (Table 1) it is seen that *A. stuartii* is a much smaller animal with a proportionately longer tail.

TABLE 13

Cranial measurements of *Antechinus stuartii stuartii* (total series)
Measurements in millimetres

		Range	Mean±S.E.	Standard Deviation
Basalar length (B.L.)	122 ♂♂	21·40–27·70	24·33±0·11	1·185
	63 ♀♀	21·35–26·20	23·35 0·13	1·062
Zygomatic breadth (Z.B.)	120 ♂♂	14·20–17·40	15·61±0·06	0·662
	59 ♀♀	13·50–16·40	14·97 0·10	0·751
Postorbital constriction (P.C.)	134 ♂♂	5·90– 7·45	6·68±0·02	0·231
	70 ♀♀	5·85– 7·00	6·38 0·03	0·234
Palatalar length (P.L.)	130 ♂♂	11·50–15·65	13·39±0·06	0·630
	67 ♀♀	11·65–14·60	12·94 0·08	0·688
Anterior palatine foramen	133 ♂♂	2·15– 4·50	2·71±0·04	0·425
	66 ♀♀	2·25– 4·60	2·68 0·05	0·432
Breadth at M^3 (B.M.)	130 ♂♂	7·90– 9·95	8·70±0·04	0·440
	70 ♀♀	7·70–10·00	8·64 0·06	0·505
Length, M^{1-3}	128 ♂♂	4·50– 5·70	5·07±0·03	0·289
	70 ♀♀	4·50– 5·60	5·09 0·03	0·292
P.C./B.L., as per cent	121 ♂♂	23·2 –30·7	27·5 ±0·12	1·28
	63 ♀♀	24·5 –30·4	27·4 0·16	1·28
Z.B./B.L., as per cent	115 ♂♂	60·3 –68·7	64·1 ±0·14	1·55
	57 ♀♀	60·0 –69·2	64·2 0·28	2·13
P.L./B.L., as per cent	121 ♂♂	51·1 –57·5	54·6 ±0·09	0·98
	62 ♀♀	53·3 –57·2	55·3 0·12	0·93
B.M./B.L., as per cent	117 ♂♂	32·9 –38·5	35·7 ±0·09	0·96
	63 ♀♀	34·6 –39·3	37·0 0·15	1·20
P.C./Z.B., as per cent	119 ♂♂	37·6 –46·2	42·9 ±0·16	1·79
	58 ♀♀	38·1 –47·6	42·7 0·24	1·84

(b) *Manus and pes*

The feet of a series of 78 specimens from Victoria and New South Wales were examined. The appearance of the palmar and plantar surfaces are similar to those of *A. flavipes* (Figure 5). The chief difference between the feet of these two species lies in the frequency of fusion of the first interdigital and inner metacarpal (-tarsal) pads. Fusion occurs more frequently in *A. stuartii,* as shown by Table 5.

As in *A. flavipes,* several discrete and conspicuously large granules are normally present between the outer metatarsal pad and the heel. Another of similar size is often to be found near the outer margin of the third interdigital pad. In some 10 per cent of cases this latter structure is strongly striated, forming a super-numerary pad on the same transverse line as the interdigital pads but not exceeding half their size. Super-numerary pads were not observed on the comparatively few specimens available of *A. flavipes.*

The strong development of striated pads in *A. flavipes* and *A. stuartii* appears to be an adaptation to their arboreal habits and is in marked contrast to the condition seen in *A. swainsonii* and *A. minimus,* both of which are terrestrial in habit (Wakefield and Warneke, 1963). The foot pads of both *A. flavipes* and *A. stuartii* are large and prominent, and only in the

TABLE 14

Cranial measurements of *Antechinus stuartii stuartii* (Loch Valley series)
Measurements in millimetres

		Range	Mean±S.E.	Standard Deviation
Basalar length (B.L.)	52 ♂♂	21·40–24·55	23·55±0·08	0·585
	12 ♀♀	21·35–23·05	22·03 0·12	0·432
Zygomatic breadth (Z.B.)	51 ♂♂	14·45–16·10	15·25±0·06	0·423
	11 ♀♀	13·50–14·85	14·27 0·14	0·465
Postorbital constriction (P.C.)	59 ♂♂	6·30– 7·10	6·68±0·03	0·194
	12 ♀♀	6·00– 6·70	6·36 0·06	0·208
Palatalar length (P.L.)	57 ♂♂	11·50–13·65	12·84±0·05	0·380
	12 ♀♀	11·65–12·50	12·08 0·09	0·295
Anterior palatine foramen	58 ♂♂	2·15– 3·20	2·63±0·03	0·205
	12 ♀♀	2·25– 2·90	2·52 0·05	0·182
Breadth at M^3	55 ♂♂	7·90– 8·80	8·36±0·02	0·180
	12 ♀♀	7·70– 8·65	8·05 0·07	0·245
Length, M^{1-3}	57 ♂♂	4·50– 5·10	4·84±0·02	0·140
	12 ♀♀	4·50– 5·30	4·73 0·05	0·170
P.C./B.L., as per cent	52 ♂♂	26·8 –30·7	28·4 ±0·11	0·80
	12 ♀♀	27·5 –30·4	28·9 0·25	0·88
Z.B./B.L., as per cent	48 ♂♂	61·2 –67·7	64·6 ±0·22	1·53
	11 ♀♀	62·0 –67·5	64·8 0·54	1·79
P.L./B.L., as per cent	52 ♂♂	51·1 –56·1	54·5 ±0·13	0·95
	11 ♀♀	53·7 –56·1	54·9 0·24	0·81
B.M./B.L., as per cent	49 ♂♂	33·9 –37·6	35·5 ±0·10	0·73
	12 ♀♀	35·3 –39·3	36·6 0·37	1·28
P.C./Z.B., as per cent	50 ♂♂	41·6 –46·2	43·9 ±0·18	1·25
	11 ♀♀	42·8 –47·6	44·5 0·40	1·32

latter is there a high degree of fusion on the pes. Here fusion is not accompanied by a reduction in size, on the contrary, the compound pad may be even slightly larger than the combined length of typical separate pads.

The structure of the claws also appears to be related to habit. In both *A. flavipes* and *A. stuartii* they are light, yet strongly curved and very sharp, and are thus well suited to climbing (see Figure 5).

(c) *Pelage*

The pelage of *A. stuartii* is noticeably softer than that of *A. flavipes*, evidently because the guard hairs are less strongly developed and hence do not affect the overall texture to the same degree. In other respects the physical components of the pelage of the two species are similar.

In dorsal colouration *A. stuartii* is a dull drab brown, lightly flecked with fawn, the latter colour occurring as a subterminal band in the main pile. Antero-posterior differentiation is absent or scarcely developed. In some specimens the ventrum is pale grey with a tinge of fawn; in others it is more strongly tinged across the midbelly with a pale brown. Ear patches and orbital crescents are absent or faint and ill-defined. The dorsal surface of both manus and pes is drab brown to grey brown. The dorsal surface of

the tail near the base is brown, flecked with fawn; below it is greyish fawn.

Some specimens are noticeably darker in colour, and in general this appears to be related to habitat. The description given above applies to specimens from coastal areas and dry sclerophyll forests. Dark specimens with warmer tonings were taken in wet sclerophyll forests in central Victoria, at Mount Macedon (3300 feet), Mount Arnold (4300 feet) and Loch Valley (1900 feet).

The few skins of *A. s. adustus* that we examined could not be distinguished from these latter specimens.

X. SKULL AND DENTITION OF ANTECHINUS STUARTII

Apart from significant size differences, the skull of *A. stuartii* closely resembles that of *A. flavipes* (see Figures 6 and 8). However, when fully adult series are compared, the bones of *A. stuartii* skulls appear lighter and the supra-occipital crests are much less developed than in *A. flavipes*. The form and structure of the bulla are the same in both species.

The respective dentitions, including the deciduous premolars, are identical except that the incisor gradient $I^2>I^3>I^4$ is less marked in *A. stuartii*; in some specimens the upper incisors are equal in size.

Measurements and proportions of a series of skulls of *A. stuartii* from Victoria, New South Wales and south-eastern Queensland are set out in Table 13. Data on a series from Loch Valley are included separately to show variation in a relatively large sample from one locality (see Table 14).

The skulls of both sexes have similar proportions, but those of males average about 4 per cent larger in linear dimensions than those of females. The sexual differences in skull length and width are both of high statistical significance ($P<0{\cdot}001$ in each case).

There is some indication from the data that the length of the molar row diminishes in a metrical cline from Queensland to Victoria, as 11 specimens from Mount Glorious (27°20′ S., 152°45′ E.) in Queensland averaged $5{\cdot}50 \pm 0{\cdot}05$ mm.; 10 specimens from Mount Irvine (33°30′ S., 150°27′ E.) in the Blue Mountains of New South Wales $5{\cdot}33 \pm 0{\cdot}04$ mm.; 7 specimens from Argalong (38°18′ S., 148°26′ E.) $5{\cdot}29 \pm 0{\cdot}04$ mm.; and the Loch Valley series $4{\cdot}83 \pm 0{\cdot}02$ mm. However, as the northern and south-western extremities of the species range are each represented by only a few specimens, the full range of this clinal variation is unknown.

Comparison of Tables 13 and 6 show that the skull and teeth of *A. stuartii* are much smaller than those of *A. flavipes*, but, in our interpretation of speciation within *Antechinus*, difference in skull size is not considered to be of primary importance. However the two species differ considerably in one cranial proportion; in relation to length, the skull of *A. stuartii* is slightly narrower in zygomatic breadth, but is also much broader in post-orbital width (see Z.B./B.L. and P.C./B.L. in Tables 13 and 6). In these two tables the proportion Postorbital Constriction/Zygomatic Breadth is given, and in this the difference between the two species is of a high order of significance ($P<0{\cdot}001$).

XI. BREEDING CONDITION OF ANTECHINUS STUARTII

Females. Marlow (1961) gave very full descriptions of the external changes associated with breeding in this species, but under the name *A. f. flavipes*. These changes are similar to those noted in other species of *Antechinus* (Wakefield and Warneke, 1963; and

TABLE 15

Body measurements of *Antechinus godmani*
Measurements in millimetres

		Range	Mean±S.E.	Standard Deviation
Head–body	13 ♂♂	122 –160	143·0±2·86	10·33
	25 ♀♀	90 –133	121·9 1·79	8·94
Tail	13 ♂♂	105 –146	123·8±3·02 *(87%)	10·90
	25 ♀♀	86 –115	104·1 1·64 (86%)	8·18
Ear	3 ♂♂	16 – 19	17·3 (12%)	
	4 ♀♀	14·5– 16·5	15·5 (13%)	
Pes	13 ♂♂	21 – 27	24·2±0·30 (17%)	1·74
	25 ♀♀	19 – 24	21·5 0·33 (18%)	1·64

* Per cent of head–body length.

this paper). The timing of events in Marlow's captive colony is similar to that which may be deduced from Victorian field records, as follows:

Birth occurs at about mid-September. The actual date was recorded in one instance where a female gave birth in captivity, on September 14-15, seventeen days after capture. Gestation in this species takes 32 to 34 days (Marlow, 1961: 208; and observations by R.M.W.).

The young remain attached to the nipples for about five weeks, and subsequent to October 20 the pouch area of all lactating females trapped was found unoccupied. A female, FWD. No. D.449, trapped on December 9, 1962, was still lactating, indicating that the young are suckled until early December at least.

The number of nipples in *A. stuartii* varies from locality to locality, but appears to be constant in certain areas. For example, all females from the Cape Otway and Portland areas of south-western Victoria had 6; those from the Grampians had 8; from the Ballarat area 10; from the ranges east of Melbourne (including Loch Valley) 8; and from north-eastern Gippsland (Murrindal and Wulgulmerang) 10. To date all reliable counts from New South Wales specimens have been 8. Two females of *A. s. adustus* from Mount Spec, near Townsville, had 6 and 8 nipples respectively.

Males. The comments on *A. flavipes* in Section VI apply also to *A. stuartii.*

XII. PLASTIC CHARACTERS OF ANTECHINUS GODMANI

(a) *Body measurements*

Thirty-eight specimens were available to us, all of which were collected in or near the Ravenshoe district on the Atherton Tableland, close to the type locality. Thomas's published measurements of the type (Thomas, 1923), an adult male, have been included in Table 15, as these were the only other reliable data on an authentic specimen that was not seen by us. The statistical analysis of head-body and pes length in this species, made by Horner and Taylor (1959), was based on a series of specimens which we have since examined and found to include *A. flavipes* as well as *A. godmani.* These authors accepted Tate's evaluation of *godmani* as a subspecies of *A. flavipes* (Tate, 1952) but drew attention to the fact that Tate also

recognized *adustus* (actually a form of *A. stuartii,* see Section VII)—which occurs sympatrically with *A. godmani*—as a subspecies of *A. flavipes.*

Table 15 shows a marked disparity between the sexes in body size, which is in keeping with the sexual dismorphism noted in other *Antechinus* (Troughton, 1941: 26; Horner and Taylor, 1959; Marlow, 1961; Wakefield and Warneke, 1963).

As far as can be judged from the series available, *A. godmani* is the largest species of *Antechinus* in eastern Australia (see also Thomas, 1923). It is slightly larger than the Cape York form of *A. flavipes* and is considerably larger than the North-east Queensland form of that species.

(b) *Manus and pes*

In structure the manus and pes are closely comparable with those of *A. flavipes* and *A. stuartii.* However, as in the latter, there is a relatively high frequency of fusion of the first interdigital and inner metatarsal pads of the pes (see Table 5). In eleven of twenty-six specimens these pads were fused on both feet and in four of the others on one foot only. The first interdigital and inner metacarpal pads of the manus were distinctly separate in all twenty-six specimens.

On each of the pes of ten specimens, three small striated super-numerary pads were noted. These were on the sole, immediately below and in line with the second, third and fourth interdigitals respectively—an occurrence without parallel in the other *Antechinus* examined by us.

The form of the claws is similar to that of *A. flavipes* and *A. stuartii.*

(c) *Pelage*

The main pile is moderately fine in texture and the guard hairs, though profuse, are relatively short. The general dorsal colour is a subdued cinnamon brown, with conspicuous glints of fawn due to a sub-terminal band of that colour in the main pile; the basal zone is slate grey. A sheen is imparted to the whole by the guard hairs, which are glistening black, fading to light brown at the tips. Antero-posterior differentiation in dorsal colour appears to be stronger in males than in females, with the rump noticeably warmer in tone than the head and upper back. In his description of the species, Thomas (1923) made no distinction between the sexes on this point. In both sexes the fur of the ventrum is a uniform greyish fawn at the tips and slate grey beneath.

Orbital crescents and basal ear patches are lacking. The sides of the face, especially at the angle of the jaw, are rufescent. The dorsal surface of both manus and pes is ochraceous brown or cinnamon brown. The tail is unlike that of any other eastern Australian *Antechinus.* The dorsal surface is almost naked, having only a sparse covering of short adpressed brown hairs, while on the underside the hairs are longer and more dense, and form a ventral crest which extends beyond the tail tip.

XIII. SKULL AND DENTITION OF ANTECHINUS GODMANI

Because this species has been confused with *A. flavipes* (see Section XII), the following comments emphasize those features of the skull and dentition which are of diagnostic importance. Other features may be seen in Figures 6 and 9.

On the average the skull is larger than that of *A. flavipes,* is narrower in relation to length and has a proportionately longer rostrum. The postorbital constriction is noticeably broader in relation to zygomatic breadth and the frontal region is depressed as in *A. swainsonii.* The anterior palatine

TABLE 16

Cranial measurements of *Antechinus godmani*
Measurements in millimetres

		Range	Mean±S.E.	Standard Deviation
Basalar length (B.L.)	7 ♂♂	30·00–32·85	31·18±0·38	1·000
	7 ♀♀	27·70–29·60	28·24 0·29	0·696
Zygomatic breadth (Z.B.)	6 ♂♂	17·55–19·75	18·73±0·27	0·669
	8 ♀♀	16·20–17·40	16·82 0·14	0·396
Postorbital constriction (P.C.)	8 ♂♂	7·55– 7·95	7·76±0·04	0·118
	8 ♀♀	7·40– 8·05	7·70 0·07	0·185
Palatalar length (P.L.)	7 ♂♂	16·50–18·30	17·20±0·22	0·590
	8 ♀♀	15·55–16·75	16·02 0·16	0·463
Anterior palatine foramen	6 ♂♂	2·50– 3·00	2·81±0·09	0·216
	9 ♀♀	2·25– 3·15	2·71 0·11	0·352
Breadth at M^3 (B.M.)	7 ♂♂	9·65–10·65	10·24±0·13	0·351
	8 ♀♀	9·60–10·30	9·92 0·07	0·208
Length, M^{1-3}	8 ♂♂	5·95– 6·25	6·11±0·04	0·118
	8 ♀♀	5·80– 6·30	6·03 0·06	0·159
P.C./B.L., as per cent	7 ♂♂	23·6 –25·7	25·0 ±0·26	0·69
	7 ♀♀	25·8 –28·4	27·2 0·34	0·91
Z.B./B.L., as per cent	7 ♂♂	58·1 –61·5	59·6 ±0·51	1·36
	7 ♀♀	58·4 –61·2	59·7 0·43	1·17
P.L./B.L., as per cent	7 ♂♂	53·2 –56·1	55·2 ±0·39	1·04
	7 ♀♀	56·0 –58·4	56·7 0·29	0·77
B.M./B.L., as per cent	7 ♂♂	31·6 –34·0	32·9 ±0·30	0·80
	7 ♀♀	33·6 –36·2	35·1 0·37	0·99
P.C./Z.B., as per cent	6 ♂♂	39·2 –43·5	41·5 ±0·53	1·31
	8 ♀♀	43·7 –48·1	45·8 0·54	1·52

foramina are short. The bulla is similar to that of *A. flavipes* and *A. stuartii* in structure, but the inflation of the alisphenoid does not extend as far anteriorly.

Of the incisors, I^1 is of medium size, only slightly proödont and separated from I^2 by a slight diastema; I^{2-4} are sub-equal, compressed laterally and not crowded together. The upper premolars are compressed laterally and are not separated by interspaces. M^4 has a small distinct metacone. I_3 bears a small accessory cusp on the buccal aspect near the heel, which slightly overlaps the canine.

Deciduous teeth were not found in any of the skulls examined by us.

In the outline of the skull as viewed from above; in the form and position of I^1; in the presence of the accessory cusp on I_3 and a metacone on M^4, *A. godmani* shows a marked resemblance to *A. minimus* (see Wakefield and Warneke, 1963: 218).

XIV. BREEDING CONDITION OF ANTECHINUS GODMANI

Females. On each of eight skins of females obtained in late November-December, 1921, the pouch area was greatly enlarged and most of the nipples were elongated, indicating that young were still being suckled. The appearance of the mammary region was essentially the same as that of other species at the same stage of development, and the period of year

when they were captured corresponds to the time of lactation in other species.

In four specimens 3 pairs of nipples were plainly visible, while in each of the other four specimens one nipple had regressed to a very small size but in each case was readily located by reference to the symmetry of the others. Thus the nipple number of *A. godmani* is 6.

Males. No information was available to us.

XV. APPENDIX

Amended distribution of *Antechinus minimus maritimus.*

Since the publication of distributional data (Wakefield and Warneke, 1963), the following additional specimens of *A. m. maritimus* have been located:

FWD. No. D.208. ♀. Anglesea, Victoria. 28 Jan. 1957.

FWD. No. D.582. ♂. Between Lighthouse Track and Waterloo Bay, Wilson's Promontory, S.E. Victoria. 5 Jan. 1965.

FWD. No. D.647. Glennie Island, S.E. Victoria. 14 June 1966.

These records treble the known range of the mainland Australian race of *A. minimus.*

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XVII. REFERENCES

Brass, L. J., 1953. Results of the Archbold Expeditions. No. 68. Summary of the 1948 Cape York (Australia) Expedition. *Bull. Amer. Mus. Nat. Hist.* **102**: Art. 2, pp. 135-206.

Finlayson, H. H., 1958. A case of duplex convergent resemblance in Australian mammals, with a review of some aspects of the morphology of *Phascogale* (*Antechinus*) *swainsonii* Waterhouse and *Phascogale* (*Antechinus*) *flavipes* Waterhouse. *Proc. Roy. Soc. S. Aust.* **81**: 141-51.

Fisher, R. A., and Yates, F., 1957. *Statistical tables for biological, agricultural and medical research.* 5th Ed. Oliver & Boyd, London.

Gould, John, 1863. *Mammals of Australia.* 3 vols., London.

Gould, John, 1854. *Mammals of Australia.* Part vi (vol. 1, pl. 37), London.

Gray, J. E., 1841. Contributions towards the geographic distribution of the mammals of Australia with notes on some recently discovered species. In Grey, G., *Journals of two expeditions . . . in . . . Australia during the years 1837, 38, and 39.* Appendix "C" vol. 2: 397-414.

Horner, B. Elizabeth, and Taylor, J. Mary, 1959. Results of the Archbold Expeditions No. 80. Observations on the biology of the Yellow-footed Marsupial Mouse *Antechinus flavipes flavipes. Amer. Mus. Nov.*, No. 1972.

Iredale, Tom., and Troughton, E. Le G., 1934. A check-list of the mammals recorded from Australia. *Mem. Austr. Mus.* vi: 1-122.

Jones, F. Wood, 1923. *Mammals of South Australia.* Part 1. Govt. Printer, Adelaide.

Karmel, P. H., 1959. *Applied statistics for economists.* Pitman, Melbourne.

Krefft, Gerard, 1866. On the vertebrated animals of the lower Murray and Darling, their habits, economy, and geographical distribution. *Trans. Phil. Soc. N.S.W.*, 1862-65: 1-33.

Le Souef, A. S., and Burrell, H., 1926. *Wild animals of Australasia.* Harrap & Co., London.

Macleay, W. S., 1841. Notice of a new genus of Mammalia discovered by J.

Stuart, Esq., in New South Wales. *Ann. Mag. Nat. Hist.* VIII: 242, pl. vii.
Macleay, W. S., 1842. Additional particulars respecting *Antechinus Stuartii*, a new marsupial quadruped. *Ann. Mag. Nat. Hist.* VIII: 337.
Marlow, B. J., 1961. Reproductive behaviour of the marsupial mouse *Antechinus flavipes flavipes* Waterhouse (*Marsupialia*) and the development of the pouch young. *Aust. J. Zool.* **9** (2): 203-18.
Tate, G. H. H., 1947. Results of the Archbold Expeditions No. 56. On the anatomy and classification of the Dasyuridae (Marsupialia). *Bull. Amer. Mus. Nat. Hist.* **88** (3): 101-55.
Tate, G. H. H., 1952. Mammals of Cape York Peninsula. *Bull. Amer. Mus. Nat. Hist.* **98**: 567-616.
Thomas, Oldfield, 1904. On a collection of mammals made by Mr. J. T. Tunney in Arnhem Land, Northern Territory of South Australia. *Nov. Zool.* XI: 229.
Thomas, Oldfield, 1923. The Godman Exploration Fund: List of mammals from North Queensland collected by Mr. T. V. Sherrin. *Ann. Mag. Nat. Hist.* (series 9), XI: 174.
Troughton, E. le G., 1941. *Furred animals of Australia.* Angus & Robertson, Sydney.
Wakefield, N. A., 1954. Observations on marsupial mice. *Vict. Nat.* **71** (1): 6-8.
Wakefield, N. A., 1960. Forlorn Hope and Reedy River. *Vict. Nat.* **77** (1): 4-11.
Wakefield, N. A., and Warneke, R. M., 1963. Some revision in *Antechinus* (Marsupialia)—1. *Vict. Nat.* **80** (7): 194-219.
Waterhouse, G. R., 1838. Characters of some new species of the genera *Mus* and *Phascogale*. *Proc. Zool. Soc. Lond.*, 1837: 75.

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Annual Reports from Groups for 1966

Annual Report from the Botany Group for 1966

Monthly meetings were held at the Herbarium, but on account of the electricity strike, the February meeting was held on 10/2/66 at Miss Lester's home, and instead of a talk by Mr. Alan Morrison, slides were shown by Miss Lester and Mr. Fuhrer. There were 21 members present.

10/3/66—With 18 members attending, Mr. Swaby gave a talk entitled "Introduction to plant ecology".

24/4/66—Miss Jean Galbraith was the speaker for the evening, and 25 members attended. The subject was "Carnivorous plants", with diagrams and colour slides to illustrate the subject matter.

12/5/66—Mr. Alan Morrison gave an illustrated talk to 32 members, on his trip along the Bourke and Wills track in Central Australia.

9/6/66—Seventeen members attended a "Members night", with short talks by the following members:

Mrs. Salau—"Fertilization of Figs".
Mr. Kleinecke—"Shelter Trees and Shrubs".
Mr. Baines—"Stinging Trees".
Miss Pearce—"Geographical Botany".
Mrs. North—"Bottle Trees".

14/7/66—Mr. Peter Kelly spoke to 19 members on "Fungus Culture", and had numerous growing specimens on view.

11/8/66—With 19 members present, Mrs. Webb-Ware spoke on "Ferns and their life cycle", with pressed ferns on display, as well as a live specimen of Azolla, in a jar of water.

8/9/66—Owing to the General Meeting falling due in the same week, only eight members were present to hear Mr. Ros Garnet speak on *Casuarinas*.

13/10/66—Mr. Bruce Fuhrer spoke to 22 members on "The recognition and structure of orchids", and illustrated his talk with slides of most of the 24 genera of Victoria.

10/11/66—With eleven members attending, Mr. Kleinecke spoke on "Edible Native Plants", and described means of obtaining food and water from numerous native plants.

8/12/66—Nineteen members came to the "Break Up" meeting for the year, and after viewing slides shown by: Miss Balaam, on "Gardens of Europe and the British Isles"; Miss Lester, on "Vegetation of Heron Island" and Mr. Fuhrer, on "Mallee Flowers"; supper was served to finish the evening and the year.

During the year it was decided to procure a record book, for plants found on each Botany Group excursion. Mr. Kleinecke offered to present the book, and he was asked to take charge of it.

During the year, a number of excursions were made by the group; the first being on Sunday 3rd April, to the Warburton district, in order to map out a route for the general excursion in May, which was to be led by the Botany Group.

Sunday 1st May—Warrandyte district was the area chosen, and the excursion was led by Miss M. Lester in the morning, while Mr. Rotherham took over in the afternoon. Many orchids were found, as well as interesting types of fungi, and many other plants; among them being two species of green correa, one having shiny leaves.

Saturday afternoon 2/7/66—Studley Park was visited, where we found at least thirty-one species of native plants. Unfortunately, Bone-seed plants are taking over in many parts.

Sunday 28/8/66—Mount Slide was the destination, and ferns the chief type of plant looked for, although quite a number of other plants were found, such as *Pittosporum bi-colour* and *Pandorea pandorana,* and Alpine Grevillea.

Sunday 2nd October—Three members only were able to make the trip to Cardinia Creek Rd., but had a very enjoyable time, identifying over 80 varieties of plants.

Sunday 23 October—Excursion to St Andrews, Cottle's Creek, and Hurstbridge district, where a great number of plants were found.

Saturday afternoon, 12th November—

Four members braved the elements to visit Maranoa Gardens, and in spite of the drenching rain, managed to get a fairly good look at the numerous native plants in flower.

Annual Report of Excursion Secretary

Excursions continue to be well patronized, and this year, several of the general excursions have been led by the various groups in the club. Marine biology was the subject of the Shoreham, Point Leo and Sorrento excursions; while the Sydenham Organ Pipes and the Old Sydney Road outings, were mainly geological. Fungi were studied at Warburton, and at Mount Hickey, wattles. The Mt. Donna Buang excursion, dealt with entomology. Other excursions were held to Mornington Peninsula, Kinglake, Glen Nayook, and to the Brisbane Ranges for the President's picnic. One very interesting trip was to the Whipstick Scrub near Bendigo, under the leadership of the Bendigo F.N.C. This is a most interesting area botanically, and the Bendigo F.N.C. and local residents are perturbed at reports that it is to opened for settlement.

The main excursion of the year was to Queensland; when members flew to Brisbane, then made a two-day bus trip to Rockhampton, returned to Gladstone, thence to Heron Island for a week. Travelling back to Brisbane by train, the final days were spent at Binna Burra and the Lamington National Park. This excursion enabled the party to meet some of our Queensland members, and members of the Queensland F.N.C., whose assistance added greatly to the enjoyment of the excursion.

The final trip of the year was to Wangaratta, where a week was spent visiting places of interest, such as Mt. Buffalo, Rocky Valley Dam, Beechworth, and Warby Ranges. The Excursion Secretary is most grateful to all who have led excursions, and assisted in various ways.

Annual Report of Geology Group—1966

An excellent year was enjoyed by all members of the group under the guidance of Mr. R. Dodds as chairman, with Mr. W. T. Sault and Mr. R. Box as joint secretaries.

Attendances continued to remain at a high level with a very active interest being shown by all members. This interest was highlighted by the group work in producing the central exhibit at the September Nature Show—at times working in the open during our winter evenings.

Group meetings throughout the year maintained our interest in Geology, with guest speakers, members' nights, and talks by our own members. Guest speakers included Mr. T. Darragh, Curator of Fossils at the Museum, and Mr. M. Marsden from the Geology Department, University of Melbourne.

Members contributions included illustrated talks by members, upon their return from private excursions to Broken Hill, and Lightning Ridge Opal Fields.

As usual, our field excursions continued to be both friendly and rewarding. In addition to our monthly excursions, two weekend excursions were held during the year. The first being to Stawell, as guests of the Stawell F.N.C.; and the second, to the old Gold Field areas of Dunolly and surrounding districts.

Exhibits continue to be an important part of our meetings with many fine examples being shown and discussed throughout the year.

A syllabus covering both group meetings and excursions has been prepared for 1967, and with interest and fellowship at such a high level, we look forward to another rewarding year.

Marine Biology and Entomology Group Annual Report 1966

Attendance at these Group meetings is rising yearly. The average for 1966 was twenty members, an increase of three over 1965.

This year we were fortunate in having seven guest speakers. In a group such as this, which combines two branches of natural history, viz. Marine Biology and Entomology, we try as far as possible to alternate speakers in these two subjects. Of our seven guest speakers, three have spoken on Marine Biology, and four on Entomology; and we hope that we will be able to maintain this average again this year.

On evenings, other than members' nights, when we have not had a guest speaker, someone from our group has given us an interesting talk, often supported by projection of 35 mm. colour slides, on some aspect of nature.

We make exhibits a feature of our meetings, and these have been up to their usual high standard, both in quality, and variety.

In conclusion, we look forward to an interesting and instructive year.

Report of the Microscopical Group for 1966

The year has been one with slight improvement in monthly attendances; the average being over 20 members per meeting. A few new members have joined the group, although there was a slight dropping away from monthly meetings of some of the original members. One such member was Mr. H. Barratt, who has done outstanding work, both in the taxonomy of, and the drawing of diatoms. Many of his drawings are classics in workmanship, done entirely without aids, such as the 'camera lucida'. During the year, Mr. E. Le Maistre resigned as chairman, because of personal and business responsibilities; but fortunately, he has been able to maintain the series of articles on "Pond Life" appearing in the *Victorian Naturalist*. His post as chairman was taken by Mr. J. Daws.

Because the programme committee had not held a meeting and arranged the programme for the year well ahead, the subjects for each meeting were usually arranged at the last minute, often too late to be announced in the magazine.

Two outside speakers were obtained: Mr. H. Mueller of the firm of Carl Zeiss, who gave a very detailed lecture on "Phase Contrast Microscopy"; and Mr. B. Hanger, of Burnley Horticultural College, who gave a very interesting talk on the use of radio-isotopes in the investigation of plant nutrition.

Members had a Saturday afternoon excursion to Albert Park Lake, where about 40 members and visitors took active part, and collected a great amount of specimen material. This was a great success, as it brought about the meeting of a great number of friends. Unfortunately, the press, who were invited along, failed to arrive. The meeting on the following Wednesday was used to exhibit specimens obtained from the outing.

During the year, there was one "Members Night", and this, as always, gave everybody a chance to talk about any specimen that may particularly interest them. One "Gadget Night" was held, but microscopical accessories these days are extremely difficult to come by, and firms are no longer interested in manufacturing such things, although they are the microscopist's "life blood"; so a very large number of the exhibits were home-made accessories, usually from odd pieces of equipment obtained from disposal stores.

Two evenings were used for the operation of micro-projectors, one to project slides from the club library of marine specimens, and the other, at which the micro-projector had inserted in its optical train, two polaroid discs, which made it possible to project plane polarized light. A great number of prepared crystal slides were thus projected, with results both startling and colourful.

Members gave talks and demonstrations on "Instant slide making", and the culturing of "micro-fungi, and cutting and staining of paraffin sections"; and a report of activities at this year's congress of the Australian Society of Limnology.

Finally, judging by the attendance and the number of questions asked, the type of evening most popular, was that on the subject of slide making.

Field Naturalists Club of Victoria

F.N.C.V. General Meeting February 13th, 1967

The Herbarium Hall was filled to overflowing, and the president, Mr. M. K. Houghton, was in the chair. Mr. and Mrs. E. S. Hanks became honorary members automatically, after over forty years continuous membership with the club.

Mr. Ros Garnet spoke in appreciation of Mr. and Mrs. Hanks, who always helped as a team, and to them, one could always turn for help in excursions and nature shows, when they gave assistance in supplying necessities and information. Their interests were wide, including birds and eucalypts especially. Mr. Hanks was appointed to the Council of the National Parks Association at its beginning.

The president presented the Honorary Members' Certificates to Mr. and Mrs. Hanks.

In responding, Mr. Hanks recalled that he joined the club when Mr. George

Coghill, the father of the present Secretary, Mr. E. H. Coghill, was the President, and who told him that outings were one of the most valuable works of the club. He spoke of the benefits he had obtained from the club. Mrs. Hanks said she had joined at the suggestion of Mr. Vic Miller, and members of Nature Study Groups under Dr. Leach. Club membership had helped them in travels all over Australia. She thanked the club for the pleasure they had in their long membership. The president said that the council had unanimously agreed that Miss M. Butchart should be elected to Honorary membership, after 15 years as Assistant Treasurer.

Mr. Hooke spoke of the great help Miss Butchart had given the Treasurer, in taking charge of subscriptions both at meetings and especially between meetings, where reminders and adjustments had to be dealt with. He moved that Miss Butchart be elected an Honorary member, and Mr. H. Haase seconded the motion which was carried with acclamation.

The Secretary announced the quarterly meeting of the National Parks Association at the Herbarium on 8th March, when Mr. Alan Miller, from Tidal River would speak.

He also announced a series of meetings of the Native Plants Preservation Society, beginning on 21st February at the C.A.E. rooms Mutual Buildings.

The subject for the evening was "West of Alice" by Mr. J. H. Willis. Mr. Willis said the trip, taken in July 1996, was a team effort, as Mr. H. A. Morrison took most of the slides, which he was projecting while Mr. Willis was providing the commentary.

The party travelled in a Land Rover with a trailer, and in addition to Mr. Willis and Mr. Morrison, included Mr. G. C. Kennewell, Cliff Wood who, as an artist, produced many sketches, and Mr. Ron Burbury.

Although there had been a drought in the centre for eight years, it broke in May with rain, and that gave plants a chance to be at their best in July, when they travelled to a point 180 miles west of "Alice" via winding routes. Permits had to be obtained from Aboriginal Welfare authorities.

Mr. Willis, by vivid description, and with Mr. Morrison at the projector, took the large and appreciative audience through a wonderland, often trackless, in the centre of Australia. Places visited included Mt. Gillen, Ellery, Serpentine, Ormiston and Glen Helen (Finke) gorges, and the 4600 ft Mt. Sonder, with its three great hummocks where rare and unnamed plants were found. Red Bank Gorge, which is only four or five feet wide in places, goes half a mile through the mountain. The Belt Range, Haast's Bluff and Papunya native settlement, Mt. Liebig—razor backed and 4270 ft. high, and with 130 kinds of wild flowers, Gosse's Bluff, Areyonga Aboriginal Settlement, James Range, George Gill Range, and King's Canyon, all were illustrated graphically.

King's Canyon walls, banded with yellow sepia and gold, are tiered with *Macrozamia* and Ghost-gum, and many rare plants. 140 kinds grow in the canyon.

At Talla Putta Gorge, in Mt. Palmer Range, there was permanent water, and the rock face was smothered with tropical ferns.

The superb colour slides made the description of the trip very real, and altogether it was a most memorable evening.

The President thanked Mr. Willis for the address and Mr. Morrison for the slides.

The exhibits from Mr. Willis included pressed specimens of plants from the trip to Central Australia:

Styphelia sp. (to be named)—the only heath in Northern Territory and confined to Mt. Sonder.

Rulingia magniflora—Ilarara Ck.

Adiantum hispidum—Talla Putta Springs.

Lindsaya ensifolia—Talla Putta Springs.

Gymnogramme reynoldsii (rare)—Mt. Sonder.

Solanum quadriloculatum—Finke R.

Acacia spondylophylla (Curry Wattle)—Glen Ormiston Gorge.

Acacia minutifolia (smallest leaved wattle in Australia)—Mt. Palmer Range.

Hibiscus intraterraneus—King's Canyon.

He also showed Powderpuff fungus *Podaxis pistillaris,* used for facial adornment by Aborigines of Mt. Liebig area; and Bat's Wing Coral-tree or Bean-tree *Erythrina vespertillo* pods, and bright red seeds.

Muscovite from Mt. Liebig, and bat guano, from cliff ledges in King's Canyon, were also displayed.

Mr. A. H. Morrison showed cones and seeds of Desert oak *Casuarina decais-*

neana, and a growing plant of the *Plectranthus* species, undescribed. This was grown from cuttings taken from George Gill Range. He also brought aboriginal grinding stones from Bagot's creek, small sandstone ones from George Gill Range, Ironstone from Areyonga aboriginal settlement, aboriginal artefacts from Bagot's Creek, land snail shells from near Areyonga, banded quartzite from Finke River, and spotted jaspar from near Mt. Willoughby.

Ian Taylor brought a specimen of *Acanthopegasus* (see moth or sea dragon).

Mr. A. J. Swaby showed *Crinum pedunculatum* from coastal swamps of NSW and Queensland; and showed how points on the sepals keep the flower together unopened, for protection in a humid atmosphere.

Mr. H. Haase brought *Beaufortia sparsa* (Gravel Bottle-brush) in flower.

Nineteen new members whose names appear in the February Naturalist were elected.

Botany Group Report

The first meeting for the year was held at the Herbarium on Thursday 9th February 1967, with sixteen members being present. Mr. Rex Filson was the speaker, giving an illustrated lecture entitled "A Continental Garden"; the Continent being Australia, and the Garden, our native flora from all mainland states. As well as the flora, there were many beautiful settings for the flowers, with views of mountains, waterfalls, rivers, and plains. Mr. Filson showed a number of slides of Ayer's Rock, in sequence from sunrise to sunset. The change in colour of the rock was captured so vividly in each slide, that it gave us an excellent idea of that marvellous phenomenom in the wilderness.

The Group made a weekend excursion to Mt. Baw Baw, from 28th to 30th January; and combined with the Latrobe Valley Group, staying at ski lodges at Baw Baw Village. Several members also camped. Miss Jean Galbraith was with the Latrobe Valley Group, and together we had a most rewarding weekend, identifying numerous plants that only grow in the high mountain areas. Some of these were Baw-Baw berry—*Witsteinia vacciniaea*; Silver daisies—*Celmisia longifolia*; Large Billy Buttons—*Helichrysum semipapposum*; Tiny creeping Fan flower—*Scaevola hookeri*; and a tiny wild cherry—*Exocarpus nana*.

Eighty or more different plants were listed from Baw Baw, and on the return trip.

Our next day excursion is to Cape Schank, on Sunday 26th February. Cars are to meet at Frankston at 10 a.m.

Geology Report 1st February, 1967

Thirty-two members and visitors attended, with Mr. Dodds in the Chair. Mr. Dodds reported that Mr. Kerry Hammond had visited Rowallan Scout Camp, where he lectured on Geology and conducted an excursion in that area. This has become an annual undertaking, and it is hoped that it will continue. Mrs. Salau spoke of the report (*Emu* Oct. 1966) on the discovery of fossil feathers from claystones of Early Cretaceous age at Koonwarra, Vic. These are the oldest bird remains yet found in the Southern Hemisphere, and are antedated only by the Archaeopteryx remains, found in rocks of late Jurassic age in Bavaria. A proposal for this year's Nature Show was put to members. This was agreed upon in principle. The subject for the evening was "Holiday Reminiscences". Members gave accounts of visits to places of geological interest, and slides were shown, with specimens collected at the places visited, being exhibited.

Exhibits

Miss Boardman. Quartzite, (Cambrian) Cradle Mt. Reserve, Tas.; Porphyritic Granite, East Coast; Pink Granite, Coles Bay, Tas.; Syenite Porphyry, Cygnet, Tas.; Limestone with Brachiopods, Hobart, Tas.; Bryazoa, Permian; Fossilized Sandstone, Permian, from Eaglehawk Neck, Tas.

Mr. Zirkler. Turquoise, Whitfield, Vic.

Mrs. Salau. Plumose Mica, Albury; Adamalite, Beechworth; Orthogneiss, Barnawartha, Vic.; Archeocyathinae (Pre-Cambrian) Flinders Ranges, SA.

Mr. Davidson. Geodes, Mexico; some containing crystals of Haematite, others with crystals of Quartz and Calcite. Agate, Mexico.

Mr. Hammond. Native Copper, Mt. Isa.

Mr. Lee. Echinoids, (Lovenia) Beaumaris; Echinoid, (Micraster) Early Tertiary.

Mr. McInnes. Fossil Wood, San Remo; Agates, Woolshed Creek, cut and polished.

Mr. Love. Russian publications on Geology.

Book Review

THE NATURAL HISTORY OF PALMS

By E. J. Corner (Weidenfeld and Nicolson)

For the palm starved Victorian possessing only one elusive palm *Livistonia australis,* this is a valuable work on the vast family of 227 genera and 2600 species.

The book begins with a review of the general palm scene, claiming the palm to be the most distinguished of all land plants. Contrasts and comparisons with some other trees are made.

There is a most interesting chapter on palm pioneers, from the seventeenth century on. A small point however, should be corrected. Robert Brown (who named *Livistonia*), did not come to Australia with Sir Joseph Banks, but with Matthew Flinders.

Separate chapters deal with each part of the palm structure; the crown, with its leaves and method of development in many species; the trunk, root, and spine; inflorescences; flowers; fruits; seed and seedlings. There is a section on rattans with a key to the genera of the rattans. Palm geography and distribution, suggesting their antiquity, are described with accompanying maps.

The chapter on the evolution of palms marshals arguments in favour of the view, that palms through their ancestry lead to the beginning of flowering plants, both monocotyledons and dicotyledons. This is in contrast to a view by some other writers, that palms may have evolved from Libaceous stock through part of Agavales. The enigma of their ancestery is here studied intensely through comparative anatomy and techniques of development.

It is pointed out, that whereas palms figure feebly in the background of pictures of Mesozoic restorations, they should be prominent. Of classifications, the author indicates the need for research, as uncertainties in accepted classifications arise from lack of understanding.

The characteristics of nine subfamilies are summarized, and a key to the subfamilies given. A simple key to the commoner fan palms, and one to the commoner pinnate leaved palms, include fifty-three of the genera.

In an appendix, two hundred and twenty-five genera are listed in alphabetic order. The countries in which they occur, the subfamily, the number of species of each genus, and (where known) the diploid chromosome number, are given.

A useful glossary explains the meaning of scientific terms, such as neoteny (occurring many times) which might worry the naturalist.

The book is generously illustrated with many fine photographs of palms, and with line drawings of details of structures including histology.

A very interesting feature is the description of the relation of various palms to the animals that live with and depend on them; especially the uses that various communities of men have made of them, and their contribution to the development of civilizations. The writing is vivid, arresting, and stimulates the imagination of the student of natural history, although the botanist could object to the taking of liberties with the intentions of the D.N.A. Codes, in the statement—"A few palms strive to avoid the ground on which they must start. They elevate their stems on stilt roots". The author's enthusiasm for the nobility of palms is contagious, as he writes of the historical Palmyra multipurpose palm; of an African *Raphia* with leaves seventy feet long, of rattan stems five hundred and fifty-six feet long, the two hundred feet Wax Palm of the Andes, a talipot *Corypha* producing a seventy feet fruiting pole ripening half a million fruits, and the physiological problem of getting massive quantities of food so high, without the help of transpiration in the defoliated pole.

This is truly a treasure of a book, from the Professor of Tropical Botany in the University of Cambridge, with a wide experience amongst palms as Assistant Director of the Gardens Department, Straits Settlement (Singapore); and as a U.N.E.S.C.O. Field Scientific Co-operation officer for Latin America. He was also leader of a Royal Society expedition to North Borneo, and of an expedition to the Solomon Islands.

F.N.C.V. DIARY OF COMING EVENTS

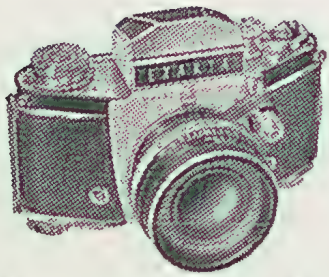
GENERAL MEETINGS

Monday, 13 March—Annual Meeting. At the National Herbarium, The Domain, South Yarra, commencing at 8 p.m. sharp.

1. Minutes of Annual Meeting of 14 March, 1966.
2. Annual Report.
3. Financial Report.
4. Incoming Officers and Council.

   The following have been nominated:

   President: Mr. L. Williams.
   Vice-Presidents: Mr. A. J. H. Fairhall and Mr. T. Sault.
   Secretary: Mr. Lee.
   Assistant Secretary: Mr. R. Condron.
   Treasurer: Mr. N. M. Taylor.
   Editor: Mr. G. M. Ward.
   Assistant Editor: Vacant.
   Librarian: Mr. P. Kelly.
   Assistant Librarian: Miss M. J. Lester.
   Excursion Secretary: Miss M. Allender.
   Council: Mr. E. R. Allan, Mr. B. Fuhrer, Mr. J. Ros Garnet, Mr. F. L. Jeffs, Mr. A. Lewis, and Mr. D. McInnes.
5. Appointment of Auditors.



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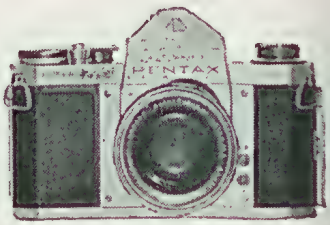

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6. Announcements.
7. Subject for the Evening: "Mosses, Lichens, and Liverworts"—Photography by Mr. F. Collett; Speaker, Mr. A. Swaby.
8. Election of Members.

(a) *Ordinary*
Mr. Christopher M. Atkinson, Flat 24, 64 Auburn Rd., Hawthorn E.2. (Interest—Geology)
Mrs. Olive Duncan (No address given). (Interest—Geology and Botany)
Mr. Erwin B. Gottlieb, 15 Springvale Road, Springvale.
Miss Jean Grant, 8 Normanby Street, Oakleigh SE.11.

(b) *Joint*
Mr. and Mrs. Graeme McCormack, Aspendale S13. (Interest—Botany and Microscopy)

(c) *Junior*
Paul Anthony Harris, 30 Greenwood Street, Upwey (Interest—Geology).
Mr. Arthur W. Hall, 14 Kooringal Road, Upwey. (Interests—Ornithology, Botany and Entomology)

9. Nature Notes and Exhibits.
10. General Business.

GROUP MEETINGS

(8 p.m. at National Herbarium, unless stated otherwise)

Wednesday, 15 March—Microscopical Group. Members' night. All interested in microscopy are cordially invited along to this meeting, as it will be an excellent opportunity to meet Mr. H. A. Dade of Benalla, who will be paying the group a visit. Mr. Dade is the author of a number of publications, an authority on Coprophagous fungi, is a past president of the Quekett Microscopical Club and a Fellow of the Royal Microscopical Society.

Friday, 31 March—Hawthorn Junior F.N.C. meeting in Hawthorn Town Hall at 8 p.m.—"Fossils of Mornington", Mr. M. Harrison.

Monday, 3 April—Marine Biology and Entomology. This group meets in Mr. Strong's rooms in Parliament House at 8.00 p.m.—enter through private entrance at south end of building.

Wednesday, 5 April—Geology Group.

Thursday, 6 April—Mammal Survey Group. This group meets in the Library of the Fisheries and Wildlife Department, Flinders St. Extn., at 7.45 p.m.

Friday, 7 April—Preston Junior F.N.C. meeting in Rechabite Hall, 251 High Street, Preston, at 8.00 p.m.

Thursday, 13 April—Botany Group.

F.N.C.V. EXCURSIONS

Sunday, 19 March—Bellarine Peninsula. The coach will leave Batman Avenue at 9.00 a.m. Fare $1.80. Bookings with Excursion Secretary. Bring two meals.

Sunday, 9 April—Serendip Wildlife Research Station. Coach leaves Batman Avenue at 9.00 a.m. Fare $1.60. Bring two meals. Note—This excursion is on the **second** Sunday in the month.

Saturday, 29th April–Sunday, 30 April—A weekend excursion in conjunction with the Latrobe Valley F.N.C. The party will leave on Saturday morning, and join the L.V.F.N.C. in an excursion to the South Cascade Creek area. An overnight stop in Yallourn will be made; and on Sunday, a visit will be made to the new 300 acre National Park in Foster's Gully, Yinnar. The fare will be $4.00; and for the bus-party, dinner-bed-breakfast has been booked at the Yallourn Hotel at a cost of $6.25 per person. Bring a picnic lunch for Saturday, and two meals for Sunday.

Field Naturalists Club of Victoria

Established 1880

OBJECTS: To stimulate interest in natural history and to preserve and protect Australian fauna and flora.

Patron: His Excellency Major-General SIR ROHAN DELACOMBE, K.B.E., C.B., D.S.O.

Key Office-Bearers, 1966

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MR. M. K. HOUGHTON
61 Winton Road, South Ashburton (25 1914)

Vice-Presidents: MR. A. J. H. FAIRHALL, MR. T. SAULT

Immediate Past President: MR. D. E. McINNES

Hon. Secretary: MR. E. H. COGHILL, 15 Baker Avenue, North Kew (85 4413).

Hon. Treasurer: MR. N. M. TAYLOR, 15 Hopetoun Road, Toorak (20 5358).

FNCV Accountant: MR. R. L. SMITH, 430 Little Collins Street, Melbourne, C.1 (67 3131).

Hon. Editor: MR. G. M. WARD, 54 St. James Road, Heidelberg N22.

Hon. Librarian: MR. P. KELLY, c/o National Herbarium, The Domain, South Yarra, S.E.1.

Hon. Excursion Secretary: MISS M. ALLENDER, 19 Hawthorn Avenue, Caulfield, S.E.7.

Hon. Sales Officer: MR. E. R. ALLAN, c/o National Herbarium, The Domain, South Yarra, S.E.1.

Group Secretaries:

Botany: MRS. P. E. MATCHES, Flat 3, 33 Abercrombie Street, Balwyn (80 3651).

Geology: MR. R. BOX, 19 Fulham Grove, Reservoir (47 5393).

Microscopical: MR. P. GENERY, 42 Barnard Grove, Kew (86 5851).

Fauna Survey: MRS. R. FRANKENBERG, 14A Glassford Street, Armadale, S.E.3.

Entomology and Marine Biology: MR. J. W. H. STRONG, Legislative Council, Parliament House, Melbourne, C.2.

MEMBERSHIP

Membership of the F.N.C.V. is open to any person interested in natural history. The *Victorian Naturalist* is distributed free to all members, the club's reference and lending library is available, and other activities are indicated in reports set out in the several preceding pages of this magazine.

Rates for January-December 1967 are:

Ordinary Membership	$5.00
Country Membership (over 20 miles from G.P.O., Melbourne)	$4.00
Junior Membership (under 18 years)	$2.50
Subscription to the *Victorian Naturalist* (non-members)	$4.00

Note: The currency of the present club year and Volume 84 of the *Victorian Naturalist* is from January to December, 1967.

Brown, Prior, Anderson Pty. Ltd., 5 Evans Street, Burwood, E.13.

F.N.C.V.

the VICTORIAN NATURALIST

Vol. 84, No. 4 APRIL, 1967

ONE THOUSANDTH ISSUE

Published by the

FIELD NATURALISTS CLUB OF VICTORIA

In which is incorporated the Microscopical Society of Victoria

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35 cents

Editorial

You have just turned the first page of the one thousandth issue of the *Victorian Naturalist*.

This is indeed a milestone in the history of our magazine. To have continued to be published for such a period of time, due to the voluntary efforts of club members in various forms of office, is no mean feat. In fact, for a publication of its type, the *Naturalist* must hold a place in Australian natural history that is, if not unique, then bordering very closely upon it.

For this reason therefore, it was felt that some effort should be made towards producing an issue with some special feature to mark this event—hence the two-tone cover. Also, in other pages of this issue, a history of the *Victorian Naturalist* from 1884 to 1967 appears. This history has been compiled from past copies of the magazine, and from information gleaned from several people connected with various branches of natural history.

Now, having reached this milestone, we look ahead; and in doing so, realize that the foundation centenary of the F.N.C.V. is not very many years ahead. It is to be hoped that when this time arrives, the status of our wildlife will have improved, so that we may still enjoy, in part at least, some of the flora and fauna beauties that were commonplace to our counterparts, nearly a century ago.

The Victorian Naturalist

Editor: G. M. Ward

Vol. 84, No. 4 — 6 April, 1967

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Front Cover:

The photograph, taken by Alan Owen, is of "Old Be-al", a giant River Red-gum in Wyperfeld National Park.

With the small boy leaning against its lower limbs, it rather symbolically typifies the F.N.C.V. at this time—an old, well established organization, offering support for the on-coming young naturalist.

THE VICTORIAN NATURALIST
1884 - 1967

The *Naturalist* was born in January 1884, and in the introduction, on page one of the first issue, this statement was made:

> It is now three years since the Field Naturalists' Club of Victoria was first formed.
>
> Hitherto the proceedings of the Society have appeared in the *Southern Science Record,* published by Mr. J. Wing, but it is now deemed time to bring out a periodical of our own. It is hoped that a larger field of usefulness will thus be opened up, and that both members and the public will gain by the publication of a monthly record of work and results, of original papers on Victorian Botany and Zoology, and of current notices of the occurrences and habitats of interesting forms.
>
> Lastly, the Club has decided to prepare, and to publish in this Magazine, scientific lists of the Victorian species of animals and plants for the use of collectors . . . . and as the services of some of the most active practical naturalists in the colony have been secured, it is confidently expected that the catalogues will be of value in creating that exact knowledge of scientific forms which will facilitate more advanced Biological Studies, . . . which must be of great practical and material benefit to the community.

The first editor was A. H. S. Lucas, M.A., B.Sc., F.G.S., and Volume 1, No. 1 was a modest issue of eight pages. In it were "Contributions to the Phytography of Australia", by Baron Ferd. von Mueller, K.C.M.G., M.D., Ph.D., F.R.S., "Entomology", by Dr. T. P. Lucas, and the first of a series of articles entitled "The Orchideae of Victoria", by Charles French.

In the second issue, T. A. Forbes-Leith and A. H. S. Lucas contributed the first of the proposed scientific lists, "Catalogue of the Fauna of Victoria. Vertebrata. Mammalia", and in later issues there were "Class II. Aves—Birds", by T. A. Forbes-Leith and A. J. Campbell, as well as "Reptilia", by D. LeSouef.

Volume 1 comprised 188 pages. It ran on to sixteen parts, concluding in April 1885, and succeeding volumes began in May and terminated the following April. This situation pertained until very recently, when Volume 82 was concluded (with eight parts only) in December 1965. Now the currency of volumes coincides with the calendar years.

In Volumes 1 and 2 there was a series of articles by F. Reader, on "The Phanerogamous Plants of Studley Park, Kew, near Melbourne", and this was followed in later years by Reader's "Contributions to the Flora of Victoria", which ran to eleven parts. Rev. W. Woolls, Ph.D., F.L.S. was another noted writer of botanical articles in those earliest years.

In Volume 2, A. J. Campbell began a series on "Oology of Australian Birds", and, in Volume 3, Mueller contributed his "Descriptions of New Australian Plants", in seven parts.

Numbers 1 and 2 of Volume 6 contained a lengthy article entitled "Trip to Croajingolong", by Professor Baldwin Spencer and C. French, F.L.S. This included the first pictorial illustrations to appear in the *Naturalist*; they comprised five plates depicting drawings of Cabbage-tree Palms, Humea, Waratah and the Ellery Rock.

The first high standard reproduction is found in Volume 7. It is the illustration of a new species of shell, *Conus segravei,* and though the picture itself is only about 2 x 1½ inches, a full page is devoted to it. The author was J. H. Gatliff, who wrote a number of items on conchology for early volumes of the *Naturalist.*

Two woodcuts were used in Volume 8, and some well processed line blocks appeared in Volume 9; but there were usually no illustrations at all in those early issues of the journal.

In 1893, Mr. F. G. A. Barnard became editor, and he was to occupy that office for a third of a century.

Volumes 10 and 11 (1893-95) contain a few photographic reproductions acknowledged to "Crisp Photo" Process, and by about 1900 plates bore the label, "Half-tone by Triumph Engraving Co."

Until the turn of the century, when *The Emu* came into being, the *Naturalist* served as a major medium for the publication of ornithological matter. The main contributors in this field, besides A. J. Campbell, were G. A. Keartland, A. J. North and Robert Hall.

Geological works appeared from the pens of T. S. Hall and G. B. Pritchard. Frederick Chapman wrote on palaeontological subjects, and H. T. Tisdall dealt with cryptogamic plants. Dudley LeSouef and Joseph Gabriel each produced lengthy reports of general natural history of various parts of Australia, and J. A. Kershaw published a number of entomological articles.

The first era of the *Victorian Naturalist* terminated in April 1925. In the issue for that month—the last of Volume 41—it is reported that "The Chairman read a letter received by the Committee from the Hon. Editor, Mr. F. G. A. Barnard, tendering his resignation of the position, which he had held continuously for a period of thirty-two years".

Barnard had edited some 6000 pages of the *Naturalist* as well as contributing a number of major items. In particular there were his historical papers dealing with the travels of scientists such as Baron von Mueller and Dr. George Neumayer.

Charles Barrett assumed the editorship in May 1925, and in the first issue of Volume 42 he made these comments:

> With the authority of the Committee, I propose to make some changes in our journal.
>
> Notes from field and the study are desired, to fill several pages of each issue. Country members, especially, are invited to contribute from their stores of natural history knowledge.
>
> But a dozen more pages at least would be needed. . . .
>
> If funds permit, our journal will be more freely illustrated.

At the same time, the new editor paid this tribute to his predecessor:

> The *Victorian Naturalist,* under Mr. Barnard's care, has not only become one of the leading publications of its class in the Commonwealth, it compares favourably with field journals issued overseas.

Of the first forty-one volumes of the *Naturalist,* only nine had exceeded 200 pages, and none had reached 250 pages. Each of Barrett's first four volumes (42 to 45) exceeded 300 pages, with Volume 43 running to 364 pages. These records were to remain unsurpassed until the present decade, after the introduction of the present-day format of the journal.

Besides increasing the size of the *Naturalist,* Barrett put his other ideas into effect. "Notes from Field and Study" became a feature of each issue, and illustrations became the rule rather than the exception. The journal's first colour plate appeared in September 1926; it was a group of

native orchids painted by W. H. Nicholls. And amongst the half-tone plates that were published about that time were some for which Charles Barrett will always be remembered, for example his "Young Major Mitchell Cockatoo", "Bearded Dragon or Jew Lizard" and "Kookaburra".

In January 1928, the Club badge, depicting the correa, replaced the shell emblem on the cover of the *Naturalist,* and this remains to the present, though it was shifted to the "Contents" page with the change of format in May 1959.

Although E. E. Pescott commenced his series "Orchids of Victoria" in 1916, it was in the mid-1920s that the *Naturalist's* orchid era really began. W. H. Nicholls published his first article in December 1925, and H. M. R. Rupp began his contributions to the journal in June 1926. Over the ensuing 25 or 30 years, Nicholls and Rupp between them maintained the *Naturalist* as the leading medium for publication of taxonomic work on Australian orchids.

In 1927, Edith Coleman, David Fleay and Tarlton Rayment each contributed their first articles to the *Naturalist*. Mrs. Coleman's studies on a wide range of subjects, and Rayment's in the field of entomology, were features of the journal for the next few decades. Fleay's numerous articles, on mammals, birds, reptiles and other animal life, still continue.

The *Naturalist* was set back considerably by the depression of the early 1930s. It recovered somewhat afterwards, but for the next twenty-five years the volumes averaged only a little over 200 pages each.

Charles Barrett relinquished the editorship in July 1939. Alex. H. Chisholm held the position for the next nine years, to be succeeded in turn by J. H. Willis (in July 1948), Ina M. Watson (March 1951), N. A. Wakefield (January 1953), A. B. Court (May 1957), N. A. Wakefield again (May 1958), J. R. Hudson (April 1964) and G. M. Ward (April 1966).

From about 1920 to the early 1930s, H. B. Williamson used the *Naturalist* for some major contributions to Victorian botany. These included his series on "Ferns of Victoria", as well as "Lilies of Victoria" and "Aquatic Plants of Victoria". About the same period, A. J. Tadgell wrote on the State's alpine vegetation.

Notable contributions in other fields in the 1930s included Frederick Chapman's palaeontological works, S. R. Mitchell's ethnology, and Charles Daley's historical articles.

The first of Willis's works in the *Naturalist* was a series of papers on fungi, beginning in April 1934. From then to the present he has contributed many articles on a diversity of subjects, with special attention to the taxonomy of mosses and flowering plants. N. A. Wakefield wrote articles on the taxonomy of Victorian ferns from November 1939 onward, and during the 1950s, on the systematics of flowering plants.

During the 1950s, the *Naturalist* declined in size and in the general interest of much of its content. Volumes 68 to 75 averaged less than 200 pages each, and one of them was only 160 pages. That was a state of affairs that had not occurred since the early 1920s. Besides, the material being published contained a preponderance of taxonomic botany and entomology that was read only by a few specialists.

The second era of the *Victorian Naturalist,* as the magazine that Charles Barrett established, terminated with the completion of Volume 75, in April 1959.

With the beginning of Volume 76, in May 1959, the format was com-

pletely changed, and, in explanation, this editorial comment appeared:

> The scientists are no longer the prominent members of the F.N.C.V., and a number of more recently established journals provide medium for publication of their researches. Vital objects of the Club are now stated to be the stimulation of interest in natural history and the conservation of our fauna and flora.
>
> It has been decided that a major step towards the achievement of these aims can be made by placing a popular nature magazine in the hands of those who have a general, but not necessarily specialized, interest in the natural phenomena round about them.

The new format is that which is used at present. Innovations included larger issues, a pictorial cover, two narrow columns of letterpress per page, higher quality paper for better photographic reproductions, and the "bleeding" of illustrations to the edges of the pages.

Features were introduced such as "Along the By-ways with the Editor", "Australian Wattles" by Jean Galbraith, and "Antarctic Wildlife" by John Béchervaise.

More recently, it has been possible to add some further features of general interest. Among these are "Diver's Diary" by Jeanette Watson, "Under the Microscope" by Eric LeMaistre, and a series entitled "Close to Nature", devoted to the general study of insects found in the home garden.

During the eight years' currency of the *Naturalist* in its present format, the average volume size has been slightly more than the 364-page record established with Volume 43. Material of popular appeal appears in it alongside papers of scientific importance. In the latter category there have been three items on land-forms and vegetation of the Gippsland Lakes by E. F. C. Bird, and a number of articles on mammals by Fleay, Wakefield and others. The popularity of the *Naturalist* in its present form is indicated by the number that are printed now—1250 copies per month as compared with 650 ten years ago.

With the completion of this thousandth issue the *Victorian Naturalist* has reached a total of 18,776 pages, exclusive of supplements!

At present, most of each month's issues go to club members, schools, libraries and scientific institutions throughout Australia, but some copies go to overseas establishments and private subscribers in various parts of the world. The countries to which the *Naturalist* goes include Great Britain, France, Germany, U.S.S.R., India, China, Japan, Canada, and United States of America.

First Record of a Pelagic Eolid from Victoria

By Robert Burn

On the basis of a single specimen, the pelagic eolidacean nudibranch *Fiona pinnata* (Eschscholtz, 1831; Eolidacea, Acleioprocta, Fionidae) is recorded for the first time from Victoria. It was collected at Kilcunda on 30 December 1965 from among the goose-barnacle, *Lepas*, growing on a piece of driftwood washed on to the shore. The collector, Mr. Peter Laird of Boronia, has donated the specimen to the National Museum of Victoria, Melbourne, where it is registered as F26,565.

Fiona is a monotypic genus ranging throughout the tropical to cool-temperate seas of the world. Its most outstanding feature is the branchial fold that projects from the larger cerata along each side of the back. In Figure 1, the branchial folds are visible as wavy lines on the upper surface of the cerata. Other than goose-barnacles, the species lives on, and eats the Siphonophore, *Velella*. Egg masses, as in the present instance, are generally found attached to the drift object upon which the *Fiona* specimens live.

Fiona is well known among the pelagic fauna washed ashore in New South Wales (Bennett, 1966). It is also listed from New Zealand (Powell, 1957: 115).

Over 70 years ago, Hedley (1895: 199) recorded another pelagic nudibranch, *Scyllaea pelagica* Linné (1758; Dendronotacea, Scyllaeidae) for the first time from Victoria. His examined specimen was collected (probably dredged), by J. Bracebridge Wilson in Port Phillip Bay, and belonged to the Biological Laboratory of Melbourne University, where it is possibly preserved to this day. No other record of this species is known to the writer.

In May 1965, a single specimen of *S. pelagica* was taken in a six inch diameter strainer, swept through brown seaweed growing in a large shallow pool at the Ocean Beach Reef,

Figure 1. Dorsal view of *Fiona pinnata*.

Photo: I. Bennett.

Photo: I. Bennett.

Figure 2. Small *Fiona pinnata* crawling among and eating the extended cirri of the goose-barnacle, *Lepas*.

Flinders. Both the collector, the late Mr. Tom Crawford, and the writer, noted that the live animal was identical in colour to the seaweed. It is now in the National Museum of Victoria, registered as F26,566.

Unlike the eolid *Fiona*, this species has a spindle-shaped body from which extend two dorsal pairs of rounded fleshy dorsal lobes. Small gill tufts stand on the inner face of the lobes. *Scyllaea* generally clings to floating seaweeds where it feeds upon hydroids; sometimes it swims in the open sea. Its occurrence in coastal waters is unusual.

S. pelagica is also recorded from Western Australia and South Australia (Basedow and Hedley, 1905: 138). The same authors published coloured figures of slugs from the latter locality (pl. 9, figs. 1-2). The present Victorian specimen is the southernmost record of the species (Marcus, 1961: 148).

The writer is indebted to Miss Isobel Bennett, Department of Zoology, University of Sydney, for the two accompanying photographs.

References

Basedow, H., and Hedley, C. (1905). South Australian nudibranchs, etc. *Trans. Roy. Soc. S. Aust.*, **29**: 134-160, pl. 1-9.

Bennett, I. (1966). Some pelagic molluscs and associated animals in south-eastern Australian waters. *J. Malac. Soc. Aust.*, **9**: 40-51, pl. 8-13.

Hedley, C. (1895). On a molluscan genus new to, and another forgotten from, Australia. *Proc. Roy. Soc. Vict.*, (n.s.) **7**: 197-200, pl. 11.

Powell, A. W. B. (1957). *Shells of New Zealand*. 202 pp. 36 pls. Auckland (Whitcombe and Tombs).

Marcus, E. (1961). Opisthobranchia from North Carolina. *J. Elisha Mitchell Sci. Soc.*, **77** (**2**): 143-151.

VICTORIAN ORCHIDS—No. 9

By C. E. Gray

Flying Ducks.

Of all the fancied resemblances attributed to orchids, I think the quaintest, and possibly the best, must be the flying ducks. These small flowers, poised so precariously on their slender stem supports, make me feel they may really take flight at any moment.

There are three species of *Caleana,* for this is the generic name, in Victoria: the Large Duck-orchid *C. major,* the Small Duck-orchid *C. minor,* and the Spectral Duck-orchid *C. sullivanii.* None is common, though the first is quite widespread, usually in dry open forest country. The Small Duck favours damp sandy heathland, while the Spectral Duck is known only from the Grampians area.

Caleana have an inverted flower, which brings the labellum uppermost, to form the head and neck of the bird. The "body" is formed by the column. This has very large side lobes, creat-

↑
Caleana major
Photo: Courtesy of B. Fuhrer

←
Caleana minor
Photo: C. E. Gray

ing a hollow space. With *Caleana major* and *Caleana minor*, should an insect alight on the tip of the labellum, the "head" bends against the strap-like neck. This in turn flicks forward carrying the visitor into the hollow "body". As the head fits neatly into the opening, the only point of exit is past the anther at the tail end. *Caleana sullivanii* has a fixed labellum and no apparent anther. The other flower segments are inconspicuous, the lateral sepals turning back in *C. major* like tiny wings, and forward in *C. minor*.

Caleana major, as the name suggests, is larger than the other members, and may have quite a long flowering stem with a number of flowers. These are wholly dark reddish-brown. The labellum is smooth. The leaves are purplish and about ¼" wide. *Caleana minor* is smaller, with fewer flowers, shorter stem and narrower leaves. The labellum is dark-coloured and covered with many glands, giving it a very pimply appearance. The remainder of the flower is a greenish or pale brown colour. Late Spring and early Summer is the flowering season.

F.N.C.V. Publications Available for Purchase

FERNS OF VICTORIA AND TASMANIA, by N. A. Wakefield.

The 116 species known and described, and illustrated by line drawings, and 30 photographs. Price 75c.

VICTORIAN TOADSTOOLS AND MUSHROOMS, by J. H. Willis.

This describes 120 toadstool species and many other fungi. There are four coloured plates and 31 other illustrations. New edition. Price 90c.

THE VEGETATION OF WYPERFELD NATIONAL PARK, by J. R. Garnet.

Coloured frontispiece, 23 half tone, 100 line drawings of plants and a map. Price $1.50.

Address orders and inquiries to Sales Officer, F.N.C.V., National Herbarium, South Yarra, Victoria.

Payments should include postage (4c on single copy).

Correction to New Members List in *Vic. Nat.* **84**, 3; March 1967—

Ordinary: Mr. Arthur W. Hall, 14 Kooringal Road, Upwey.
Mr. Dunne, 6 McLaren Street, Upwey.

Junior: Paul Anthony Harris, 12 years. 30 Greenwood Street, Pascoe Vale. (Interests—Geology, Microscopy)

Subscriptions Now Due

Membership fees and subscriptions to the *Naturalist* for the year 1967 were due for renewal by January 1. If you will not be paying your fees at one of the forthcoming general meetings, please remit them by post. Receipts will not be sent for payments by cheque unless requested.

This procedure will save office-bearers time, and expense, in sending out reminder notices.

Readers' Nature Notes and Queries

These columns are available for all members, young and old, to bring before others their own observations in nature. Correspondence may be sent to the Editor, 54 St. James Road, Heidelberg.

Further news of the Bower-birds at Tyers

Continuing her Bower-bird notes, Miss Jean Galbraith writes—

Shortly after writing the notes on Bower-birds last July (October Bush Brushes), I was away for a month (26 August–26 September), and a letter from my sister-in-law told me of the discovery of a completed bower on an overgrown garden path. It was found two days after I left, and was described as "just like the pictures of bowers, with thick walls and floor of very thin sticks. The walls were about one foot high and 9 ins. apart, and the floor was decorated with blue rosella feathers, with an arrangement of violets, picked without stems, in front."

The birds left, as usual, in mid-spring—about a week before I returned—and heavy rain left the bower rather bedraggled. When I saw it the violets had gone, but there were several limp clusters of *Scilla nutans* and Grape Hyacinths, and several blue rosella feathers scattered about, and some blue wool, a piece of blue knitting needle, and a serap of blue plastic in the bower.

I have no doubt it was built by the bird I described as "the largest and fattest". He it was who would posture and display and toy with fuchsia bark, and soon after the note was written, I noticed a ring of blue feathers making a narrow circle round each eye—although he had no other blue feathers. The bower was built mainly of thin fuchsia twigs. A fellow-member of the Latrobe Valley F.N.C. watched the big bird "playing" at the bower.

Large-billed Scrub-wrens

From Mrs. Ellen Lyndon of Leongatha, Victoria, come these notes.

Leafing through back numbers of the *Victorian Naturalist* recently in search of some particular information, I came across Mr. Wakefield's paper on the Large-billed Scrub-wren in Victoria, (75. Jan. '59). It brought to mind an observation of my own in early January of last year.

We were camped on the Wellington River above Licola, and had made a day trip into the high country in the direction of Mt. Useful, marked on the map as Connor's Plains. In contrast to the harsh dry country of the Wellington, this is wet rainforest, and to me of far greater interest and appeal. We stopped for lunch by a roadside hut on a thickly forested ridge, which gave extensive views when there was sufficient break in the trees. While walking onwards after lunch, I was severely scolded by small wrens from the fastnesses of a dense gully on the upper side of the road. I forced my way through the undergrowth and climbed on to a mossy log, and called the birds up to see what they might be. I was elated when they proved to be Large-billed Scrub-wrens. Their indignation at the presence of a stranger, brought three birds sometimes to within four feet of where I sat, and I was able to observe them closely, and had no doubt as to their identity. I had known these birds years before in the Dandenong Ranges. They acted much as do the White-browed Scrub-wrens in similar circumstances, but they kept to a higher level in the scrub, and came into the open more than do their more domesticated cousins of country gardens.

On the same day, and the same road, but at a somewhat lower elevation, an Olive Whistler was calling in dense bush. I was able to bring it up fairly closely. This spring, near Darlimurla in South Gippsland, the same species sat within ten feet of my head, and made the forest ring with his sweet and haunting calls; which are surprisingly loud at close quarters. To really observe the birds of the bush, I feel it is necessary to be alone, however desirable it may be to have witnesses to verify one's observations.

close to nature

Can you imagine yourself devouring a whole leg of lamb in fifteen minutes? I doubt that even the most ravenous gourmand could manage this; yet this is the equivalent of what I saw take place two or three weeks ago.

While working in the garden, I was conscious of the large number of bees about—particularly around the Gravel Bottle-brush (*Beaufortia sparsa*). (Incidentally, since ceasing to use organic phosphate garden-sprays some three years ago, the number of bees has increased considerably; a point, I think, which is rather significant.)

As I looked more closely among the branches of the shrub, my eyes focussed on a common green praying mantis, standing upright amongst the small leaves. At this particular moment, the mantis was virtually at rest; the only movement being of its remarkable triangular shaped head, two angles of which are taken up by the very efficient compound eyes. Its head moved in harmony with the path of approach of an unwary bee, or to obtain a better view of me as I leaned closer.

I left the mantis temporarily, wondering whether bees were included in the diet of these insects. On my return, I found that they most certainly were, for the mantis had apparently only just captured a bee, which was securely impaled and held by the folded forelegs.

I think there is no more vivid illustration of the macabre side of nature, as when this relentless hunter is seen devouring an insect which still lives.

The apparent relish with which it chews and gulps large lumps of the unfortunate prey, pausing only to toss away wings and the harder parts of the victim, appears almost revolting; yet in this world of insects, it is merely part of a set pattern of behavior.

Much has been written about the mantids, therefore, in these pages, only the more interesting features to be observed will be mentioned.

The praying mantis belongs to the same order as do the cockroaches, crickets, grasshoppers, locusts, and stick-insects. These all belong to the Orthoptera*—*orthos* referring to "straight", and *pteron* to "wing"—because each of those mentioned has straight, or narrow forewings.

The forelegs of the mantis (raptorial claws), are among the most specialized of all insect limbs. When they are folded, very little indication is given of the vicious spines which are arrayed on these legs. But when unfolded, the picture is very different. A row of spines on the third section of the leg, run the length of a longitudinal ridge; while on the second section, a corresponding longitudinal groove appears, with a row of spines along the raised edges of the groove. These rows of spines, when the legs are folded, fit one row between the other two; so that any insect taken by the mantis is impaled from above and below, twice over—once with each foreleg. On the inner surface of the second section of these legs of this particular species, appears a spot of a beautiful blue-green colour. This is quite easily seen when the forelegs are extended.

When the mantis launches its strike,

* Some authorities divide this group of insects into three orders, placing the cockroaches and mantids into the order Dictyoptera; and further dividing these into two distinct sub-orders, Blattodea and Mantodea respectively.

the direction cannot be changed. This is rather like the movement of the arm of a tennis player when performing a service; and since the mantis is successful in about 80% of its strikes, there must be a fairly efficient computing arrangement between eyes and foreleg muscles.[1]

The male and female mantis differ a little in appearance. The female has a larger abdomen, particularly during the summer months, and she has much less efficient wings. The male is more slender in build, and quite often suffers the same fate as male spiders, during courtship. In fact, observations have been noted, where in his headlong approach toward the female, the male has been captured and beheaded.[2]

However, so powerful are the particular nerve arrangements stimulating this mating behavior, that the decapitated male's body is brought to a position clear of the female's mandibles, and mating is completed.

The reader is probably familiar with the egg capsule of the mantis, and has seen it as a hard, multi-celled nut-shaped object, quite often attached to the rail of a paling fence. This is deposited as a frothy mass from the end of the female's abdomen, and hardens quite quickly on being exposed to the air. An egg is placed in each cell, and on hatching, a miniature replica of the parents emerges—swaying to right and left on spindly legs. As the insect grows, it undergoes a series of moults; until, with the final moult, the insect bears its wings. The cast skin is of a milky-white appearance, and may sometimes be seen attached by one leg, hanging from a twig of the plant on which the mantis is living.

The particular mantis described, is actually an introduced species, but because of its early introduction into Australia, it has become quite established, and is accepted as a regular member of the Australian insect population. As a matter of fact, Australia has about eighty native species belonging to the mantid family, but a great number of these are not often seen, due to either their small size, or their bushland habitat.

A number of biological experiments have been carried out with mantises, and they make rather interesting reading. The appropriate reference may be found under the heading "For further reading", at the conclusion of this article.

A great deal of interesting study can be made if mantises are kept in an observation box; particularly if an egg capsule can be found which still contains the unhatched young. One precaution which you should take however, is the secure covering of the container, while still allowing for air holes. Otherwise, overnight hatching may result in the tiny mantises appearing all over the loungeroom ceiling next morning; for it seems one of the inherent characteristics of the mantis, on being liberated, to climb to the highest position possible.

[1] *Nerve Cells and Insect Behavior*, p. 136.
[2] *Nerve Cells and Insect Behavior*, p. 164.

FOR FURTHER READING

Child, J., 1960. *Australian Insects*, Periwinkle Press, N.S.W.

Leach, J. A., *Australian Nature Studies*, Macmillan and Co., Melb.

McKeown, Kieth C., 1942. *Australian Insects*, Roy. Zool. Soc., N.S.W.

————, *Insect Wonders of Australia*, Angus and Robertson, Sydney.

Morrison, P. C. *Along the Track with Crosbie Morrison*, (A selection of his Nature Talks by Lucy Crosbie Morrison), Whitcombe and Tombs, Melbourne.

Riek, Edgar, 1963. *Insects of Australia*, Jacaranda Press, Brisbane.

Roeder, Kenneth, D. *Nerve Cells and Insect Behavior*. Harvard University Press.

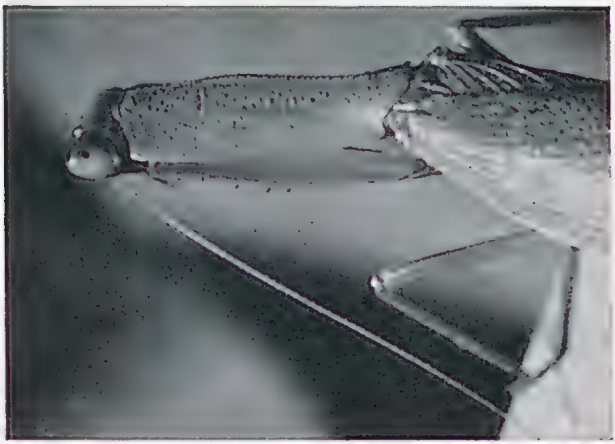


Fig. 1. Head and thorax study of Green Praying Mantis. Note large compound eyes, beaded antennae, and folded forelegs with spines barely visible.

Fig. 2. Praying Mantis devouring bee (see text). Note spines impaling bee.

Fig. 3. Egg capsule of Green Praying Mantis. Note that some cells have been vacated, while others are still sealed.

Book Review

YOUR AUSTRALIAN GARDEN

No. 3 Mat and Ground Cover Plants

Published by the David G. Stead Memorial Wildlife Research Foundation of Australia.

Price 45c

This booklet keeps up the high standard set in booklets No. 1 and No. 2 of the same series. The series of course, is designed to promote the growing of native plants in gardens, and is the combined effort of a number of members of the Foundation and their friends.

To the average gardener, mat plants belong to a group with a very limited selection; but this publication dispels such ignorance, for it contains more than one hundred and fifty species of low-growing and ground-covering natives.

A description of the habit of growth in its natural environment, together with flower color, and treatment in home gardens (where known), is given with each species.

A surprise to many may be the inclusion of Acacias and Banksias among ground-cover plants, but there are quite a few.

Certainly, you should add this booklet to No. 1 and No. 2, and it may be obtained through the Secretary, Box 4840, G.P.O., Sydney, N.S.W.

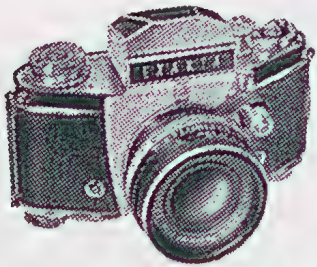
—G.M.W.

Correction to Vict. Nat. 84: 52 (Feb. 1967)

("List of rare plants of the Whipstick")

The statement, line 6 from bottom of page, that *Westringia crassifolia* was "named by Dr. Melville of Kew, who raised it to specific rank" is quite erroneous. *W. crassifolia* was described as a new species by Mr. N. A. Wakefield in *Vict. Nat.* **73**: 187 (Mar. 1957)—based on material collected by John Kellam in Sept. 1956.

Also, in the same article, some of the plants listed as belonging to the Whipstick area, may also be found in other areas around Bendigo.



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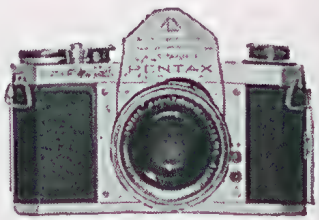

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Radiocarbon dates from Narrandera, New South Wales, Australia

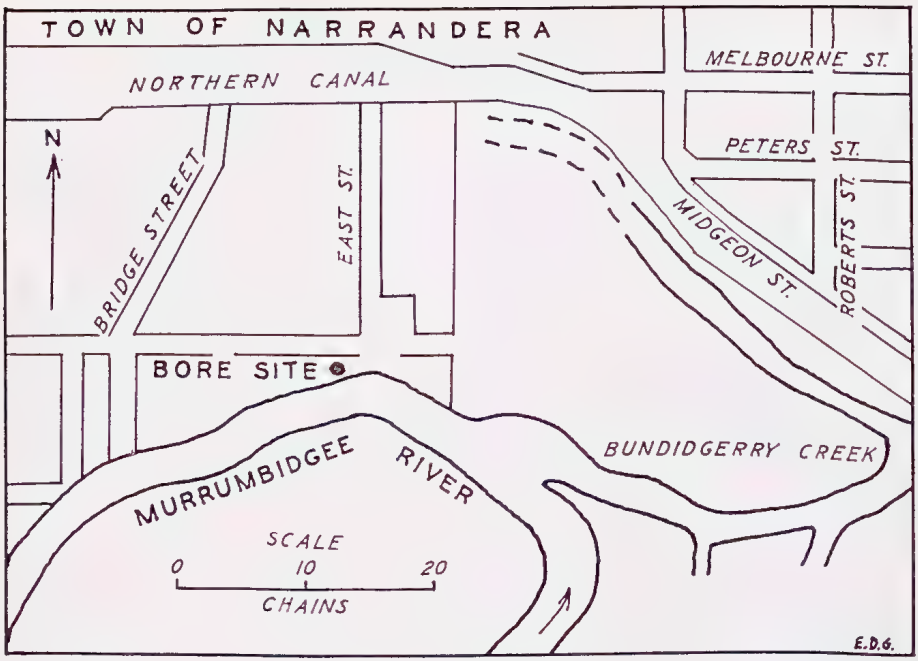
By Edmund D. Gill* and F. N. Bethune

Twenty feet from the Murrumbidgee River at Narrandera, N.S.W., a twelve inch percussion bore was sunk for water (Fig. 1). The log of the bore was as follows:

Lithology	Thickness	From	To
Grey clay	5 ft.	0 ft.	5 ft.
Brown clay	2	5	7
Yellow and brown sandy clay	20	7	27
Grey sand and quartz pebbles	5	27	32
Yellow sand and gravel	7	32	39
Grey sand and gravel	4	39	43
Sand and gravel with blue clay	14	43	57
Blue clay	2	57	59
Heavy grey gravel with quartz pebbles up to 2 in. diameter	21	59	80
Brown gravel and sand	12	80	92
Brown clay	2	92	94
Puggy brown sand and clay	17	94	111
Brown silty clay	6	111	117
Blue silty clay	5	117	122
Brown sand with white quartz pebbles up to 1 in. diameter	9	122	131
Fine puggy sand and clay	4	131	135
Coarse brown sand	8	135	143
Stiff blue clay	6	143	149
Puggy brown sand and clay	1	149	150
Blue silty clay	2	150	152
Blue sand	1	152	153
Blue silty clay	2	153	155
Fine grey sand with some coarse pebbles	3	155	158
Coarse grey sand	19	158	177
Fine grey sand	4	177	181
Coarse grey sand	11	181	192
Dark grey clay at Static water level 16 ft. below the surface			192

The quickly changing lithology, the great range of grain size, and the alternating oxidized and unoxidized rocks are what may be expected in a fluviatile environment on a rapidly sinking terrain.

* National Museum of Victoria, Melbourne.



Locality Plan of Bore Site.

Fossil wood

In this bore, numerous pieces of humified wood were obtained from between 158 and 192 feet. Because of the casing methods used, there is no doubt that the pieces came from those beds. Examination of the wood by Mr. H. D. Ingle of C.S.I.R.O. Division of Forest Products, yielded no information on the species of trees that provided the wood, as the structures were too collapsed for identification. However, from the arrangement of the medullary rays, he considered the wood to be eucalypt. The genus *Eucalyptus* is characteristic of Quaternary and Pliocene floras in Victoria, but is very rare indeed before that time (Gill, 1957 a, b, 1964, fig. 8). A sample of the wood fragments was sent to Professor Kunihiko Kigoshi of Gakushuin University in Japan, who dated one portion as beyond the range of the method (>33,000 B.P.), but another portion of the same sample gave a radiocarbon date 32,000 ± 1200 years B.P. (Gak-843). It is thus likely that the strata between 158 and 192 feet in the above bore, span the upper limit of radiocarbon dating as carried out by Professor Kigoshi (i.e. without using enrichment techniques). The sample was taken from too great a stratigraphic thickness, but in this instance, nothing could be done about it. Further samples are being taken from other bores, limiting the stratigraphic thickness as far as possible, then by radiocarbon dating, seeking to establish the mean rate of sedimentation in various parts of the Murray Basin.

Associated with the wood samples dated, was a sample of matrix cemented with pyrite. The sediment was a coarse siliceous sand, poorly sorted,

and with both rounded and angular grains, the latter being much more common—a fluviatile lithology. The trees that yielded the fossil wood thus grew on the flood plain of the ancestral Murrumbidgee River.

Murray Basin Sedimentation

The Murray Basin is a major structural feature of Australia, consisting of a complicated sunkland of over 100,000 square miles in extent. The infilling sediments are of Mesozoic and Cainozoic age, movements having continued over this long period. Tectonic movements are still continuing, and this radiocarbon dating (along with others in process) are intended to commence measuring the rate of movement in various places. A lateritic profile of Lower Pliocene age (Gill, 1964) called the Timboon Terrain, is found at the surface in many places in the Murray Basin. In other places, successively younger terrains occur (Butler 1959 and references, Churchward 1963 and references, Rowan and Downes 1963, Gill 1966).

If the humified wood from the Narrandera bore is taken as coming from the average depth of 175 feet, and the period of subsequent sedimentation is taken as 32,000 years, then the average rate of sedimentation is about one foot per 180 years. At Psyche Bend near Mildura, fossil wood was obtained reliably from a depth of 35 feet, and dated by radiocarbon as 5400 years B.P. (NZ-196), giving a sedimentation rate of about one foot per 154 years. It would be valuable to have a net of such dated sedimentation rates over the basin. Among other things, it would throw light on current tectonic movements, and assist understanding of the present terrain.

References

Butler, B. E., 1959. Periodic phenomena in landscapes as a basis for soil studies. *C.S.I.R.O. Soil Publ.* 14.

Churchward, H. M., 1963. Soil studies at Swan Hill, Victoria, Australia. *Austr. J. Soil. Sci.* **1**: 242-255.

Gill, E. D., 1957*a*. The stratigraphical occurrence and palaeo-ecology of some Australian Tertiary marsupials. *Mem. Nat. Mus. Vict.* **21**: 135-203.

————, 1957*b*. Whence Australia's mantle of green? *Austr. Mus. Mag.* **12**: 217-220.

————, 1964. Rocks contiguous with the basaltic cuirass of Western Victoria. *Proc. Roy. Soc. Vict.* **77**: 331-355.

————, 1966. Geochronology of Victorian Mallee ridges. *Proc. Roy. Soc. Vict.* In press.

Rowan, J. N., and Downes, R. G., 1963. A study of the land in north-western Victoria. *Soil. Conserv. Auth. Vict., T.C.* 2.

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Field Naturalists Club of Victoria

Annual General Meeting
13 March, 1967

About 100 members attended the Annual Meeting, with Mr. M. K. Houghton in the chair. No doubt the Labor Day holiday had some effect on the numbers present.

The meeting opened on a sad note, with the news that Mr. Arthur Webb had passed away on the morning of this very meeting. Mr. Swaby spoke about Mr. Webb, who had been an active member since 1955. He was always prepared to help with the Nature Show, and any other club activities. He was connected with, and was highly respected by, the Boy Scout movement, and will be missed greatly from both organizations. The sympathy of the members at the meeting was shown by a tribute in silence.

The minutes of the Annual Meeting of 14 March 1966, were taken as read, and accepted on the motion of Mr. Woolard and Mr. J. Strong.

Miss M. Butchart was presented with an Honorary Member's Certificate, after her long term of 14 years as Assistant Treasurer. Much applause accompanied this presentation.

Mention was made of the April, 1967 issue of the *Victorian Naturalist*, as being number 1000; and that it was intended to produce a special issue to mark this event.

Mr. E. H. Coghill moved that the Annual Report published in the March *Naturalist* be adopted, and Miss Woolard seconded the motion which was carried.

Mr. Houghton then spoke of the tremendous help and the great benefit to the Club, that the retiring Secretary, Mr. E. H. Coghill, had been over the past eleven years. Mr. Coghill had also been largely responsible for the organization of the interesting speakers over the years.

Mr. Houghton moved that the financial statement and balance sheet as published in the *Naturalist*, be adopted. Mr. E. R. Allen seconded the motion.

In paying tribute to Mr. Hooke's long association with the Club as either Honorary Auditor or Treasurer, the President emphasized Mr. Hooke's professional knowledge which had been of great assistance to the Club. It would be hard to believe that any other Office-bearer could have given any greater assistance than he, in those 40 or so years.

Mr. J. Baines endorsed the President's remarks, and suggested that reference be made to the four retiring Officers, in the *Naturalist*.

The subject for the evening was a short lecture on "Lichens, Liverworts and Mosses". Some excellent photography in close-up, by Mr. F. Collett, was accompanied by a commentary from Mr. A. J. Swaby.

Explanatory slides on the details of the life histories of these lowly plants, or plant-fungus combinations (as are the lichens), were shown, and helped greatly in appreciating the fascinating close-up photographs which followed. Other slides shown included some loaned by Miss M. Lester. It was a most informative lecture on a subject which is not often heard.

The President thanked Messrs. Collet and Swaby for a most interesting lecture.

The election of Office-bearers then followed, with Mr. M. Houghton stepping down from office, and in so doing, thanking the past Office-bearers and Club members for their spontaneous friendliness and help over his 5 year term as President.

He welcomed Mr. L. Williams into the position, who in turn thanked members for their nomination.

The incoming President then called upon Mr. D. McInnes to comment on the immediate past President's achievements, but he suggested that Mr. F. Zirkler should move a motion of thanks to Mr. Houghton, and that his long term of office be placed on record.

Mr. Zirkler in moving this, mentioned that it did not take long for a feeling of respect and confidence to grow around Mr. Houghton. He had commanded this well founded respect for the remainder of his 5 year term.

Mr. D. McInnes seconded this motion before applause broke out.

The following are the 1967 Office-bearers:
President: Mr. L. Williams.
Vice-Presidents: Mr. A. J. H. Fairhall and Mr. T. Sault.
Secretary: Mr. D. Lee.
Assistant Secretary: Mr. R. Condron.
Treasurer: Mr. N. J. Taylor.
Assistant Treasurer: Mr. A. Blott (Council to confirm this appointment).
Editor: Mr. G. M. Ward.
Librarian: Mr. P. Kelly.
Assistant Librarian: Miss M. J. Lester.
Excursion Secretary: Miss M. Allender.
Council: Mr. E. R. Allen, Mr. B. Fuhrer, Mr. J. Ros Garnet, Mr. A. Lewis, Mr. D. McInnes, Mr. M. K. Houghton (immediate past-President).

The new Members whose names appeared in the March *Naturalist* were elected.

Under General Business, mention was made of the Stawell F.N.C. Nature Show to be held at the Stawell Town Hall from the 6th-12th April, 1967.

Exhibits included a crystal of Feldspar in granodiorite from South Morang, Victoria; and various types of Quartz crystals from Kingsgate, in the Red Range area of N.S.W.

A member of the Echinoid family, *Cidaris*, from San Remo back beach was shown.

Mr. Zirkler exhibited a photograph of Epipogium, or the Ghost Orchid. It was first found in England in 1856, and seen only ten times in the next 100 years.

Mr. Fuhrer brought some mosses from Lake Tarli Karng, these being *Fissidens rigidulus*, and *Bryum blandium*.

Other exhibits were: A liverwort, *Marchantia berteroana*, showing female organs and gemmae cups; and *Lunularia cruciata*. Mat lichens on walnut branch and quartz from Cooma; and four species on rocks taken at San Remo back beach.

Botany Group Meeting—9th March

There were twenty-three members and visitors, with Miss Lester in the chair.

The feature for the evening was the projection of colour slides taken on a recent trip to Mount Baw-Baw. There were several views of the surrounding scenery, showing the habitat of the pictured flora. There were many lovely slides of masses of Silver daisies (*Celmisia longifolia*), and Trigger plants (*Stylidium graminifolium*), others of single flowers or plants; some of the more unusual ones being the Mountain Gentian: *Callistemon sieberi*; *Richea continentalis*; *Prasophyllum sultonii*; *Prasophyllum alpinum*; Sky lillies (*Herpolirion novae-zelandiae*); and many others. Another interesting slide was of a Stone-fly which is a species of *Thaumataterla*. It is a very large insect belonging to a primitive species, and discovered here only comparatively recently. Members showing slides were: Mr. Kleinecke, Mr. Fanning, Mr. Blott, Mr. Morrison, Dr. Turner and Miss Lester. Mr. Kleinecke then read a report on the plants found during the last excursion by the Botany Group to Cape Schank, where thirty-seven different plants were identified.

At the next meeting, to be held on Thursday 13th April, Mr. Bruce Muir will speak on "Botanical Collecting", mentioning old collections held at the Herbarium, in particular.

Marine Biology and Entomology Reports for December 1966 and January 1967.

December 1966—This meeting was chaired by Mr. R. Condron, 28 members being in attendance.

Mr. Condron again asked that anyone finding pupae of the Wanderer butterfly, to please notify him, and he would take steps to tag the insects on emergence. Miss White asked if allowing the pupae to hang, would damage them. Mr. Condron suggested tying them with cotton to the branch on which they rested.

Speaker for the evening was Miss Baalam who showed some very interesting and beautiful slides of her recent trip abroad, and at the same time gave quite a humorous commentary. At the conclusion of her talk, Mr. Condron moved a vote of thanks on behalf of the Group, and members showed their appreciation by a hearty round of applause.

EXHIBITS

Mr. D. McInnes showed a species of marine polychaete worm which he said was new to him.

Mr. R. Condron showed the larva of a species of Emperor moth, which he said was not the common one.

January 1967—25 members were present at this meeting which was chaired by Mr. R. Condron.

Mr. D. McInnes reported that he had visited San Remo at the weekend, and found quite a variety of marine life in this area. He will lead the next F.N.C.V. general excursion to San Remo on 19th February. There will be a good low tide on that day at approximately 11.54 a.m.

The Secretary announced that the guest speaker for the March meeting would be Mr. A. Neboiss, Curator of Insects, National Museum. Mr. Neboiss will show a coloured movie film taken by him, on the stone-fly.

Speaker for the April meeting will be Mr. F. Collet, who will show some of his excellent nature-photography slides.

Exhibits

This being a Members' night, there were a number of interesting exhibits:—

Mr. P. Kelly showed some bright green eggs of an insect, unidentified, but probably those of a moth. They made a beautiful picture under low microscopic power.

Mr. J. Strong showed, under the microscope using polarized light, the radula of the common variegated limpet, *Cellana tramoserica*.

Mrs. Z. Lee showed a wasp, unidentified, taken at Mallacoota, and stated that she saw a number of larvae about 3 inches long, some of which had made a web and pupated. She described them as being a smoky grey color with diagonal markings. Mr. Condron said that they were probably the larvae and pupae of the "Old Lady Moth".

Mr. D. McInnes showed two live holothurians of the species *synapta*, and also a micro slide of the ossicles of this species. Mr. McInnes explained that if one touched one of this species, it had a sticky feeling; which was caused by the ossicles which lie on the surface sticking into one's skin.

Mrs. Moyle (a visitor) showed some fine specimens of Tun shells taken at Boydtown near Eden, after a storm.

Mrs. McInnes showed a box of mixed shells taken at San Remo.

Mr. R. Condron showed four specimens of the Caper white butterfly *Anaphaeis jarva teutonia*, two males and two females, one of each sex set in reverse. He explained that a large swarm of these butterflies occurred in early December.

Mr. Condron also showed a jewel butterfly *Hypochrysops bysos*, which he had taken near Bogong township.

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F.N.C.V. DIARY OF COMING EVENTS

GENERAL MEETINGS

Monday, 10 April—At National Herbarium, The Domain, South Yarra; commencing at 8 p.m.

1. Minutes, Reports, Announcements.
2. Correspondence.
3. Subject for the evening: "Bats"—Mr. J. Hyett.
4. Election of New Members.

(a) *Ordinary:*
Miss Monica Davis, 36 Illawarra Road, Nth. Balwyn.
Mrs. Barbara Huggins, Lot 150 Scenic Drive, Eltham North. P.O. Box 62, Eltham. (Interest—Botany, Marine Biology, Entomology).

(b) *Country:*
Mrs. A. W. Bennett, The Vicarage, Terang, Victoria. (Interest—Ornithology, Botany)
Mr. J. G. Russell, Patho, Victoria. (Interest—Reptiles)
Mr. N. H. Simpson, Tonimbuk via Bunyip, Vic.

(c) *Junior:*
Ian Wettenhall, Narrawa, Holbrook, N.S.W. (Interest—Fauna)

5. General Business.
6. Nature Note and Exhibits.

MICROSCOPICAL GROUP

A special "Pond Life" excursion will be held by Members of the Group in the Tanti Creek area of Mornington for the purpose of collecting specimens, which will be displayed at the April meeting.

Recently this area has been showing great promise as a source of many classical forms of pond life. Those wishing to attend, are advised to meet at the Frankston Railway Station on Sunday, 16th April, at 11 a.m. Transport will be provided for those without their own.

GROUP MEETINGS

(8 p.m. at National Herbarium, unless otherwise stated)

Thursday, 13 April—Botany Group. Mr. R. V. Smith will speak on "Weeds".

Wednesday, 19 April—Microscopical Group. Exhibition of specimens from excursion.

Friday, 28 April—Hawthorn Junior F.N.C. meeting in Hawthorn Town Hall at 8 p.m.

Monday, 1 May—Entomology and Marine Biology. This group meets in Mr. Strong's rooms at Parliament House at 8.00 p.m.—enter through private gate at South end of building.

Wednesday, 3 May—Geology Group.

Thursday, 4 May—Mammal Survey Group. This group meets in the Library of the Fisheries and Wildlife Department, Flinders Street Extn., at 7.45 p.m.

Friday, 5 May—Preston Junior F.N.C. meeting in the Rechabite Hall, 251 High Street, Preston (north from Bell Street), at 8.00 p.m.

F.N.C.V. EXCURSIONS

Sunday, 9 April—Serendip Wildlife Research Station. Coach leaves Batman Avenue at 9.00 a.m. Fare $1.60. Bring two meals. Note—This excursion is on the **second** Sunday of the month.

Saturday, 29 April-Sunday, 30 April—A weekend excursion in conjunction with the Latrobe Valley F.N.C. The coach will leave from Flinders St., opposite the Gas and Fuel Corporation building, at 8.30 a.m. on Saturday. At Moe, members of the L.V.F.N.C. will await the arrival of the coach, and lead the excursion to South Cascade Creek area. Accommodation for the coach party has been booked at Yallourn Hotel at a cost of $6.25 per person for the overnight stop (D.B.B.). On Sunday, an excursion will be made to the new 300 acre national park in Foster's Gully, Yinnar, after having inspected the Hazelwood Arboretum. Bring a picnic lunch for Saturday, and two meals for Sunday. The fare will be $4.00, and should be paid to Excursion Secretary by April General Meeting.

Thursday, 31 August, to Sunday, 10 September—Broken Hill. Details next month.

Field Naturalists Club of Victoria

Established 1880

OBJECTS: To stimulate interest in natural history and to preserve and protect Australian fauna and flora.

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Geology: MR. R. BOX, 19 Fulham Grove, Reservoir (47 5393).

Microscopical: MR. P. GENERY, 42 Barnard Grove, Kew (86 5851).

Fauna Survey: MRS. R. FRANKENBERG, 14A Glassford Street, Armadale, S.E.3.

Entomology and Marine Biology: MR. J. W. H. STRONG, Legislative Council, Parliament House, Melbourne, C.2.

MEMBERSHIP

Membership of the F.N.C.V. is open to any person interested in natural history. The *Victorian Naturalist* is distributed free to all members, the club's reference and lending library is available, and other activities are indicated in reports set out in the several preceding pages of this magazine.

Rates for January-December 1967 are:

Ordinary Membership	$5.00
Country Membership (over 20 miles from G.P.O., Melbourne)	$4.00
Junior Membership (under 18 years)	$2.50
Subscription to the *Victorian Naturalist* (non-members)	$4.00

Note: The currency of the present club year and Volume 84 of the *Victorian Naturalist* is from January to December, 1967.

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the VICTORIAN NATURALIST

Vol. 84, No. 5 MAY, 1967

Published by the

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Editorial

At last, the Helmeted Honeyeater, the only bird found in Victoria and nowhere else in Australia, has officialdom on its side. The Fisheries and Wildlife Dept. has finally taken steps to ensure that the habitat of this bird is not completely destroyed, by declaring a reserve of approximately 400 acres in the area surrounding the Woori Yallock Creek, to the east of Melbourne.

The existence of a second colony of the Helmeted Honeyeater, along the Cardinia Creek, has apparently been in doubt for the past six months; and it is therefore timely that the creation of this reserve has been forthcoming.

But while we are receiving this small piece of "icing", we are asked to swallow a rather large "bitter-pill"—because to the north-east of Melbourne, at Wonga Park, an area of some 900 odd acres will be sold at public auction during this month. It will be auctioned in two lots of approximately equal size, with the successful buyers at liberty to subdivide these areas into 10 acres lots.

This may not appear to be too disastrous at first thought, but when one considers the rather flexible legislation which has governed our town planning exercises of the past 20 years, it is quite conceivable that within the next two decades, this so-called "bushland housing estate" may become another suburban shambles!

At least half of the area at present, contains a host of fauna and flora; and there are reports of the echidna having been seen there. However, the area is probably one of the least unscathed rural settings which are left close to Melbourne.

A recommendation by the Parliamentary Public Works Committee, in November of last year, that part of the area be set aside for water storage, was not accepted by the Melbourne and Metropolitan Board of Works. This was not because of any potential that the area may have as a national park, but because of the fact that some of the water, going to metropolitan households, would have to be chlorinated.

It appears therefore, that this area is earmarked for development in some form or other, and it is perhaps unfortunate that the M.M.B.W. rejected the proposal put before it. For it would have been far better to have had a water storage surrounded by a reserve, and controlled by a responsible body, than to have the possibility of the combination of no reserve, and unimaginative subdividers, as has happened in the past.

It is to be hoped that this time, however, the future owners of the area will deliberate for some time, and devote intelligent thought to the matter, before their decisions are made on the fate of this land.

The Victorian Naturalist

Editor: G. M. Ward

Vol. 84, No. 5 4 May, 1967

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Front Cover:

Graham Pizzey photographed these Grass Owls at Ingham, in Queensland. The Grass Owl (*Tyto longimembris*), is rather rare; and is unusual in that it nests in grass tussocks instead of hollow tree limbs.

The Warby Ranges

By J. Ros Garnet

Travellers along the Hume Highway between Benalla and Wangaratta, cannot fail to notice a low range of hills which, for much of the distance, lie parallel to the road. The Highway crosses the range at a well-known lookout spot known as Warby's Spring, near Glenrowan, but for the most part a broad stretch of river flood plain separates the range from the road, and it is safe to say that most travellers along the Hume do little more than glance toward these ranges. Yet they, the Warby Ranges, have for a long while attracted the more leisurely traveller who is prepared to leave the bitumen and explore them.

On old maps of Victoria they were labelled Fullers Range, and in later times, doubtless due to a mis-reading of a surveyor's calligraphy, as Futters Range. I have had no opportunity of investigating the origin of either name but would anticipate that Fuller was a surveyor who worked that district, possibly in the 1840's, which is about the time a selector named Warby took up a pastoral run in the locality. At any rate, locally, the hills came to be known as Warby's Ranges because they happened to be in his run, and modern map makers seem to have chosen to commemorate Warby rather than Fuller (or Futter?), so now they are known to all as the Warby Ranges.

Botanists have reason to know them, or at least know of them, because they are the only known Victorian habitat of two species of plant—the Spurwing Acacia, *Ac. triptera,* and the Sandalwood, *Santalum lanceolatum.* The former was originally collected by Mueller in 1853 when he explored the district in the course of his monumental journey into the Victorian alps. The latter was discovered in the mid-1950's by Miss Doreen Nason of Kuring-gai, Wangaratta South. Only two or three specimens of the tree were located on the steep slopes of a gorge. One of them is said to have since died, but one of the old trees has put up what appears to be sucker growth (possibly as a response to root damage), and if their destruction by browsing sheep and rabbits can be prevented, they may flourish and eventually replace the parent tree when it succumbs to the processes of old age.

Both the Acacia and the Sandalwood are found north of the Victorian border but far removed from the Warby Ranges. I have seen the Spurwing Acacia thriving abundantly in a mallee association north of the Murrumbidgee, near Griffith, 200 miles to the north of the Warbys. How close to the border one will find the other I do not know, but it is one of the commoner components of the Mulga association in south-west New South Wales.

The ranges have a good deal more to recommend them than the two rare plants. Miss Nason has studied the flora fairly thoroughly over the years, and her records include a number of other interesting species. The occupants of Kuring-gai are especially proud of a colony of fully-skirted Austral Grass-trees *Xanthorrhoea australis,* many of which, largely through their vigilance, have persisted unburned on the rocky slopes at the

Taminick end of the ranges. The colony includes some magnificent tall specimens whose trunks are concealed to ground level by a heavy veil of pendant dead foliage. Higher up on the ridges one enters a wilderness of wildflowers and shrubs—Common Fringe-myrtle, Bush-peas, Parrot-peas, Lilies, Orchids, and hosts of other attractive plants. On the southern or south-eastern slopes, wildflowers are particularly varied and abundant; and because of this about 15 acres were selected for reservation as a municipal wildflower sanctuary, to protect and preserve a characteristic selection of the flora of the area. I was present at its official opening in October 1958, when the then member for the district, Mr. A. Cook, M.L.A., performed the ceremony in the presence of 50 or 60 people including the Mayor of Wangaratta, representatives of the Soil Conservation Authority, Forests Commission, the Native Plants Preservation Society, and a number of other interested bodies. An inspection followed the opening ceremony, and my notes taken at the time, furnish some information which could be of use at present to those of us who believe it is worth supporting the present movement to have a great deal more of the ranges reserved for Nature conservation. My impression was that there could be danger to the permanence of the sanctuary through erosion on the hillside above as a consequence of quarrying. Although these upper slopes are reserved for quarrying purposes, it was understood that the area would not be used because the rock faces are regarded as unsuitable. In another direction, and beside the sanctuary, extensive excavations were being made—stone quarrying on the slopes and gravel extraction not far from the boundary fence. A good example of careless working was apparent at the gravel pits indicating lack of supervision by municipal officers. The Soil Conservation Authority representative undertook to have a look at the site when the operations cease, so that steps might be taken to remedy any unsatisfactory situation which could certainly arise from the quarrying operations.

A brief examination of the hills at

A Sandalwood (*Santalum lanceolatum*) in the Warby Ranges.

Photo: Mrs. J. Ros. Garnet

the south-western end of that part of the range where the sanctuary was established, showed that its wildflower content is considerably better and more diverse than in the sanctuary. Although it is privately held land, it is pretty useless for much else than harvesting timber for fence posts. Consequently it is unlikely to suffer greatly. In a grove of Common Fringe-myrtle, one specimen assumed the proportions of a small tree, easily 15 feet high and with a trunk almost 8 inches in diameter. Several species of plant of apparent rarity or of restricted distribution are to be seen, including a *Pultenaea*, and a *Prostanthera* which appears to have since been identified as *P. decussata*—another oddity of plant distribution. The Spurwing Acacia was noted "as not rare but evidently confined to a couple of localities away to the north-west". One of the "rufa group" of Greenhood orchids occurs on the top, above the sanctuary. If the plant is what I suspect it to be, it is what we have come to recognize as *Pterostylis squamata*, which the late Victor Say and his friend John Stephens discovered there in the 1930's. I have seen it growing near Cootamundra and at The Rock near Wagga, but years ago a specimen came to me from Rainbow—three places all far from the Warby Ranges.

Local interest in the Warby Ranges Wildflower Sanctuary has grown steadily with the passage of time, until today there is a demand for something more extensive in the way of a permanent nature conservation reserve, which will, in years to come, satisfy the need of a community for an open space of natural wilderness. The need is becoming increasingly evident as population grows and the countryside becomes more and more urbanized.

The urgency of the matter was demonstrated in October 1966, when the Upper Murray and Upper Goulburn Regional Committees of the

Grasstrees in the area of the proposed National Park. The estimated height of the tallest is 14 feet.
Photo: J. Ros. Garnet

Central Planning Authority called a public meeting at Benalla to discuss the future of the Warby Ranges—to consider the possibility of having a large part of the ranges permanently reserved, and the form which such a reservation should take. The meeting was preceded by a tour of inspection of the Ranges and was attended by members of the several Shire Councils in the two Regions, by the Minister of Lands and an officer of his Department, by the Member for Benambra, by representatives of other Government departments and agencies concerned in land use (Forests, Rivers & Water Supply, Fisheries & Wildlife, Soil Conservation and National Parks), of the Benalla Field Naturalists' Club and of the Victorian National Parks Association—the Vice-President (Mrs. G. Taylor) and the Hon. Secretary (myself)—and a number of prominent local citizens including Mr. Clive Nason and Miss Doreen Nason. Mr. Nason's viewpoint was endorsed by most of those who had an opportunity of speaking. Our own contribution to the discussion emphasized the view that, no matter what title or name be given to it, a reserve be sought and established without delay. Were there to be procrastination, piecemeal alienation would probably continue until what remained would be worthless for the purpose of Nature conservation.

Being mainly a granite formation overlying Ordovician sandstone sediments, the valleys, lower slopes, and margins, were enriched with good soil and gravels. Most of the areas of that character had been already taken up for horticultural or agricultural purposes, and the remainder was under close scrutiny by interested parties. The tops are grazed (and fired rather more frequently than is good for them), and some large quarries and gravel pits scar the cliffs and slopes, but there still remains much that is worth conserving. A forecast, voiced at the meeting, saw stately homes of the wealthy, gracing what are now

A typical example of a Forest Red Gum, in the Warby Ranges.

Photo: J. Ros. Garnet

timbered hillsides from which one sees the lights of the cities lying on the plains below. It could happen that way, and the Benalla gathering was warned that if it did, public interest would have been sacrificed in the interests of the few.

After the public meeting the Regional Committees met to discuss the question, and a letter, subsequently received from the Secretary of the two bodies, advised that a joint Regional Sub-Committee had been appointed to investigate in detail the future of the Warby Ranges, and to prepare a report for submission to the Government. A more recent letter from the Secretary, stated that the Sub-Committee considered that it should endeavour to obtain the greatest possible amount of information on the future potential of existing Crown land and other areas in the Ranges, and therefore, it had decided to seek expert opinion, in the form of written evidence, from Municipal Councils and interested organizations, and individuals, in regard to the future use of the Warby Ranges, before presenting its report to the two Regional Committees concerned.

The National Parks Association is among those organizations invited to submit evidence, and its written statement was required to be presented on or before the 28th February 1967.

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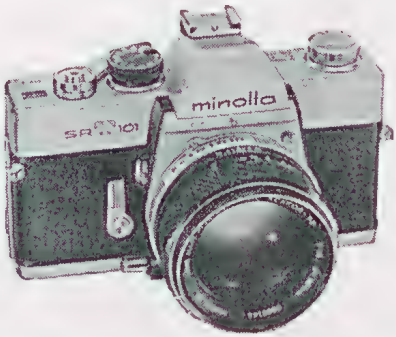

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Naked Eye Observations of the Moon

L. M. M. BEADNELL

Astronomy, as one of the oldest natural sciences, surely deserves a place in a journal such as the Victorian Naturalist. It is for this reason, that articles, similar to this one, will be included from time to time; and it is to be hoped that they will appeal to and perhaps fill the want of some of our members.

It is a very sorry person who is not uplifted by the beauty of a moonlit night, especially when the moon is reflected from a sheet of water. But, while appreciating this beauty, how many of us really look at and properly observe the moon? It is amazing how much we can find out just from observations with our unaided eyes—though binoculars are a great help.

Let us first look at the phases. Everyone knows these, but it might be a good thing to run through them with your head for the earth, a ball for the moon, and a torch for the sun. A lunation which lasts for about 29½ days, starts when the new moon is in line between us and the sun, and is therefore invisible. As it moves round us, a tiny crescent (wrongly called the new moon) becomes lit up. The crescent waxes steadily till at seven days old the moon appears like a mirror-image of the letter D. It continues to wax until it is on the other side of the earth from the sun, and is therefore full. Then it starts to wane, repeating its phases in reverse and looking like a D at the third quarter. Of course we all know that the horns of the moon point away from the sun, and no Field Naturalist would place a star, like Coleridge, "within the nether tip".

Most of us know, too, that the moon, as it travels round the earth, rises about 50 minutes later every night, the actual amount of delay varying considerably, according to the position of the *ecliptic* (see below). But not everyone can say, without working it out with the ball and torch, exactly where and at what time to look for the moon in its various phases. The full moon must of course rise at sunset or it would not be full, and it must pass the meridian about midnight and set at sunrise; the new moon must rise at sunrise, and set at sunset; and must pass the meridian at noon. While at the first quarter the moon, being at right angles to the sun, must rise at midday, set at midnight, and cross the meridian at sunset; and in the third quarter it will rise at midnight, set at noon, and cross the meridian at sunrise. The times are not of course exact; they vary with the position of the *ecliptic* and other factors.

Also, have you noticed that the moon "rides high", that is crosses the meridian, high in the sky in winter, but low in summer? The sun of course, does the opposite—again, due to the *ecliptic*.

The *ecliptic* is the path in the sky through which the sun appears to travel as we view it from different directions during our annual journey round the sun. The equator of the sky is the prolongation of the earth's equator into the sky, and cuts the horizon east and west. The plane of the moon's orbit round us is very nearly the same as that of our orbit round the sun, and the moon is always very nearly on the ecliptic.

Most of us know that we always see the same face of the moon, because it

Seas or Maria.

1. Mare Nectaris (Sea of Nectar)
2. Mare Foecunditatis (Sea of Fertility)
3. Mare Crisium (Sea of Crises)
4. Mare Tranquillitatis (Sea of Tranquillity)
5. Mare Serinatis (Sea of Serenity)
6. Mare Nubium (Sea of Clouds)
7. Mare Humorum (Sea of Humours)
8. Mare Imbrium (Sea of Showers)
9. Oceanus Procellarum (Ocean of Storms)

The two large craters A, Tycho, and B, Copernicus, are only visible with binoculars.

rotates on its axis in $27\frac{1}{3}$ days, the same time as it takes to revolve round the earth. This becomes very clear if you, representing the moon, walk round a chair, representing the earth, turning your body at the same time so that you are always facing the chair. When you have completed one revolution you will have rotated once on your own axis.

Some people find it difficult to understand why it takes two days longer for the moon to reach the same phase than it does to make one revolution. This is because during the time of one revolution the earth itself will have moved and therefore the moon will have a little further to go before it reaches the same position in the sky relative to the sun.

But we do not always see exactly the same face. Because of what we call *libration,* or rocking, we can see from time to time, a little way round the edge, to the right or left, top or bottom. In all, we can see about 59% of the moon's surface. *Libration* is due to slight variations in the moon's orbit and speed.

Next lunation, when the moon is full, have a good look at its face. You can see the dark areas, called *maria* or seas, very clearly. If you have binoculars you can also see the large craters, Tycho and Copernicus, and bright lines of rays radiating out from

them. But you must hold the binoculars very steady. When the moon is not full, you can see with binoculars, many lovely craters and mountains with beautiful sharp shadows; these are best seen at the *terminator,* which is the line of demarkation between the lit and unlit parts. When the moon is full, you cannot see these; partly because the moon is too bright, and partly because at the full, the sun is directly overhead (to the moon-man), and therefore there are no shadows.

But to get back to *libration.* I suggest you draw the face of the moon very carefully and compare it with the diagram, noting, for example, just where on the face is the Mare Crisium. Next month, draw it again. You will find the face will have slipped a bit. It would be very interesting to draw every full moon for a year and observe how very much the "man-in-the-moon" changes his face.

By naked eye observations, or more easily with binoculars, we can discover quite definitely that the moon has no atmosphere, or almost none. The markings are quite clear and sharp, not blurred at all as an atmosphere would make them. And an observation of that rare but fascinating phenomenon, an occultation of a bright star or planet, further proves it. You will have noticed the moon moves eastward against the background of the stars (although really moving westward) travelling the distance of its own diameter in a little under an hour. During this journey it may pass in front of a star or planet, occulting or eclipsing it. The star vanishes and reappears very suddenly, not gradually, as it would if seen through an atmosphere surrounding the moon. Prior to the full, the star vanishes at the dark side and reappears at the bright side; after the full it vanishes at the bright side and reappears at the dark side. To see a star vanishing or appearing suddenly as the invisible dark side of the moon approaches or recedes is startling!

And finally, what of that lovely spectacle, the old moon in the young moon's arms? It is merely the dark part of the moon, which receives no light from the sun, being lit up by the sunlight reflected off the earth; equally lovely, for early risers, is the earthshine in the arms of the final crescent of the old moon.

SUBSCRIPTIONS

Fewer than one half of members have paid subscriptions for 1967.

If you have not yet paid your subscriptions, please would you attend to this matter straight away. To avoid the expenses of approaching each unfinancial member individually, any assistance you can give in this regard will be very much appreciated.

When making payment of your subscription would you forward it direct to the Club's Accountant, Mr. R. L. Smith, at 430 Little Collins Street, Melbourne, but make your remittance payable to The Field Naturalists Club of Victoria.

Neil McD. Taylor,
Hon. Treasurer

Camping in the Mallee

By M. F. Bland

We arrived at the camp site on Saturday, 27th August, 1966. It was in the midst of semi-cleared mallee, sixteen miles north of Panitya, on the Ouyen Highway. A sheltered spot was chosen, with bushes of melaleuca to provide a windbreak, and trees to which the tent ropes could be secured.

Near the camp, we saw Purple-backed and Black-backed Wrens, Scrub Robins, and Crested Bell-birds. Nearby, there were numbers of round, spreading acacias, just bursting into their bloom of bright golden balls.

Further away from the camp, where spinifex was beginning to grow, but still fairly clear of growth, a flock of Chestnut-crowned Babblers were seen three times by different members of the party, at the same place. As I watched, they were most amusing, for as they fed, they leapt into the air, catching insects, and then plane gracefully down to the ground. They enjoyed digging in the sand with their beaks, and flinging the sand over their shoulders, and would all rush up to the one digging and try to interfere, until the digger became annoyed and attacked them, whereupon they would leap out of reach.

The Crested Bell-bird was also very adept at catching flying insects. I was watching one against the sun, and as it opened its wings, they showed red with the bright sunlight shining through. The crest was raised and lowered as it caught insects.

On Monday, 29th August, the seven of us went to an uncleared area, between two quite large cleared areas. We were intent on locating the Western Whip-bird. The morning was fresh as we started out at 8.15, but it gradually became warmer. We went south, crossing over sand ridges lying east and west. These ridges were mostly covered with a species of *Melaleuca* of a round shape—tall and rather sparse at the base. There was no small undergrowth on these ridges. In the troughs, between the ridges, the Mallee eucalypt species were abundant. *Baeckia crassifolia* and *Hibbertia stricta* were quite common, but were in isolated clumps. We travelled about one mile south, and then moved over to the interior of the area and worked over another swathe, back to the road from whence we had started. Mrs. P. Reilly carried a tape recorder and played the birds' song, in the hope of obtaining a response, or luring the bird into the open. But we were not successful.

We were successful however in finding a Lowan's open mound. The hole was about 2'6" deep. It was not in use. We thought it may have been in use during the previous year, as it had only a small patch of grass on one side.

On the second day we worked again over the same area, but in a different section. In this part, the sand ridges were covered with the same melaleucas, but there were also areas of large bushes of *Leptospermum coriaceum*, only just coming into flower. This species looks slightly similar to *L. laevigatum*, but the leaf is much smaller and greener than the coastal one. They seemed to be growing isolated from one another, never interlaced with each other. Again, we were not successful in finding our quarry. Another mound was found. It looked

Photo by the late Fred Lewis.

MALLEE FOWL'S MOUND

much the same age as the previous one and also was not in use.

Wednesday, 31st August, was spent at Mr. Roy Ribbon's eucalyptus farm and distillery. Yellow-fronted Honeyeaters were nesting on his property. The nest is the hanging type, amongst the leaves, with a deep cup held together with cobwebs. Mr. Ribbons said a pair of these birds arrived about 10 years ago and nested. Since then they have come back each year, in increasing numbers. It is very like the Yellow-plumed, which was common around our camp. It has a broader yellow plume and a slightly yellower head. There were Purple-backed Wrens, and *Hylacola cauta* in the Spinifex here. The Mulga parrots and Mallee Ringnecks came in a flock to feed on grain—dropped for them in the yard near the "still". On another part of Mr. Ribbon's land, in a spinifex area, we found a pair of Mallee Emu Wrens, and Tawny-crowned Honeyeaters.

On 2nd September we went to Rockhole Bore via Peebinga in South Australia. Rockhole is in Victoria, but there was no way of getting there from this side of the border. The road there was very sandy, but just safe enough for our cars if we kept moving. Mr. Frank Jones drove a Land Rover. Rockhole Bore was a cleared plain, with a strange flat rock section in the middle of red, firm sand. There was a hole in the rock about 5 feet in diameter, with brackish water; but to which animals and birds must come to drink. It had a smaller depression nearby with a worn channel leading into another hole, full of sand now, but which Mrs. Catherine Hough said was fashioned by aborigines. This was to channel water into the hole to keep it permanently full.

This cleared area was surrounded by sand dunes covered in scrub. Where the land had not been cleared, there were some beautiful shapely specimens of weeping pittosporum, *Callitris* of two or three varieties, mallee eucalypts, and *Casuarinas*. These trees seemed to be peculiar to this particular spot. Black-backed Wrens, Crested Bell-birds, Galahs, Major Mitchell Cockatoos, all were present. Mrs. Pauline Reilly found a White-winged Triller here—her first sighting of that bird. We went along the track, in Frank Jones' Land Rover now, deeper into the scrub, and found emus, *Hylacola cauta* and Weebills. *Leptospermum coriaceum, Hibbertias* of two varieties, *Baeckia crassifolia,* large bushes of a variety of *Hakea,* and plenty of *Acacias,* with stunted *Callitris,* grew amongst the spinifex further out.

On 3rd September, Mr. Ribbons, his son, and a friend, took us out to the Loxton Road, to look for the Whipbird again. We tramped through thick bush and broom, and *Melaleuca uncinata,* but again were not successful.

I went back to Bolton's Bore to watch at the water hole there. A party of 23 emus was feeding in a paddock on the other side of the sand ridge from the bore. We saw a great many emus really in the areas we visited. A pair of White-fronted Chats came to the water to drink and bathe. One was not fully adult, indicated by its plumage.

We had been watching a chough's nest here, with four eggs in it. As it was too high to climb to, we used the poles from the mist nets, to hoist a mirror up to see the eggs. Another chough's nest was found in the morning, while looking at one of these birds picking up white feathers in its beak, dropping them, and then trailing them in its feet and tripping. Finally it got up into a tree, and went to a nest on a limb. We watched this nest

until we left, but no chough was seen to go near it again.

Yellow-plumed Honeyeaters, Striated Pardalotes, Restless Flycatchers, Mulga Parrots, Galahs and Mallee Ringnecks were about, and a Crested Bell-bird was calling, but not seen. I went along the road for a short distance and stopped at a very large cleared paddock, where P. Reilly and I had seen a lot of Banded Plover the night before. I went to see if there were any nests. Two birds made a great deal of noise and threat display while I was still 300 yards or so away, so I examined every outcrop of kunkar stones on the way to the noisy birds, till finally, I found a nest, nearly stepping on it. It had 3 khaki-green freckled eggs nestling up to a pinkish kunkar stone about the same size as the eggs. It was a neat, round nest, fairly shallow, with a light sprinkle of powdered rabbit droppings lining it. I took note of its position and went back to camp. Next day at the same time in the afternoon, I went back with P. Reilly and C. Hough, and we found two eggs hatched, and the other egg just chipped. The chicks were scattered from the nest, two feet away in different directions, shamming quite dead. We did not stay long. Next day at 9 a.m., as we were leaving our camp for Sunset Tank, Rod Sympson and I went again to see if the third egg had hatched. While we were walking across the paddock, R. S. nearly trod on another nest of three eggs right in our path. It was exactly the same size and depth as the first, lined with grass and rabbit droppings, but it had no kunkar stone to make a fourth object in the nest. When we reached the first nest, we found the third egg had hatched and the chick still in the nest. The other two were even further scattered from the nest than the previous day, and were still shamming death. The parents did not seem to be nearly so agitated now, there was no threat display, or flying around, or screaming; in fact one would think they were not concerned any more. R. S. had found a nest a few days earlier in quite another area, but also in kunkar stones. The birds had been displaying aggressively, and he had managed to get right up to them with Hugh Nicholson. While Hugh was photographing this violent threat display at their feet, R. S. saw the eggs close by. C. Hough and I went on Sunday, 4th September, to see if the eggs had hatched too, but we searched and searched in the kunkar, which was much thicker here, and we saw no sign of the nest or chicks. The parents were hovering around but in a quiet way. I think the chicks must have hatched and scattered pretty far. Seeing how far the other chicks scattered from their nest and how remarkably like the stones they were, I think we could have missed them, because the eggs in the nest were really quite easy to see, once we had pinpointed the position. While we were there we looked at the nest of an Eastern Whiteface in a hollow post, which we had been observing for some days. It was very far down and was lined with emu feathers, which curled delicately over the chicks like a curtain, making them very hard to see, even with a torch.

We also had a look to see how our Chestnut-tailed Thornbill was getting on with her nest building, again in a hollow post, but entered from a hole in the side, instead of at the top of the post. It was beautifully lined on all sides, with a roof of bark pressed against the insides of the post. We could not see if any eggs had been laid, without poking a finger in, so we left it alone.

Russell Jones found an Owlet Nightjar, nestling in a hollow tree just by the Bore where we had been parking our

Photo by J. D. Waterhouse.

MALLEE EMU-WREN

cars day after day, when filling up our water bottles. This was when we were leaving, and taking a last look at the Bore. We could see the little bird sitting very tight, about two feet down with beady eyes staring at us. A small dark-brown owl-like bird, it seemed about six inches long. Flashlight photographs were taken, and we proceeded along to the Ouyen Highway, back towards Ouyen, but turned off at Danyo, and went about five miles north to a salt flat covered in Salicornia and some saltbush, surrounded by grazing land. We had been told Rufous Field Wren, *Calamanthus campestris,* was here. We could hear them calling, and I managed to catch a glimpse of one perched, for a few seconds, on the wire of a fence. It was just long enough to note its striated breast.

We also found Purple-backed Wrens in several parties, chasing each other, females expertly eluding males with dodges and back passes, and leaping over them, rather like a toreador stepping aside at the last moment from a bull, charging at full gallop.

We went on from here to Sunset Tank, where we intended staying overnight. This sandy track was through Mallee eucalypts, *leptospermum coriaceum* in flower, acacias and spinifex. We would then come upon a cleared area, very pretty, with a larger species of Mallee eucalypt, and stands of *Callitris.* The soil here was firm hard sand, covered in grass. The thick scrubby uncleared areas seemed to be the sandy ridges of white colour.

We went on to Sunset Tank and the cattle yard, and decided it was too bleak, so went back to a place we noticed earlier, when we had got out to inspect a sick rabbit, and which H. Nicholson killed and buried. A notice further back had indicated that poison was laid.

It was a pleasant spot, park-like and quite off the track. We put up our tents under a good clump of trees and made an enormous fire for our evening meal. The night was very clear and starry, and the moon rose later. We had a good look around in the morning in this lovely place, called Kow Plains, and finally moved off about midday. The birds seen here, were Red-backed Parrots, Major Mitchell Cockatoos, Galahs, Ringnecks and Mulgas, a Spiney-cheeked Honeyeater, Black-capped Sitellas, Brown Treecreepers, Eastern Whiteface, Yellow-tailed Thornbills, Red-capped Robin male and female, Restless Flycatcher, Rufous Whistler and Grey Thrush. We stopped at a water-hole for lunch on the way back, still on Kow Plains, and had a very good look at a Horsefield Bronze Cuckoo hopping on the ground. C. Hough and P. Reilley climbed a sandy hill, and found some interesting wild flowers, one of them being *Bredameyera calymega,* which is a pretty bright blue flower growing close to its stalk. From here we went on to Ouyen to clean up, and fill the cars with petrol for our trip home.

F.N.C.V. Property

Any person who is holding any property belonging to the Club, would they please notify the Property Officer, J. Ros. Garnet.

Readers' Nature Notes and Queries

These columns are available for all members, young and old, to bring before others their own observations in nature. Correspondence may be sent to the Editor, 54 St. James Road, Heidelberg.

The Editor's file of Nature Notes has been exhausted; please endeavour to refill it as soon as possible. Everyone, including the Junior Members are encouraged to contribute.

This description of a pleasant excursion, together with observations of fauna and flora, makes interesting reading. It comes from H. R. Hobson of Rosebery in N.W. Victoria.

Mid October and mid spring, and an enjoyable weekend experienced in an excursion through the Grampian Ranges with its panorama of wildflowers and birdlife, terminating at the newly established Port Campbell National Park on Victoria's South Coast—

The night of the 14th was spent at Halls Gap in readiness for the ascent to Mount William, nearing 4,000 ft. and the highest of the Grampian Peaks. Fortunately the morning of the 15th was fine and clear and the new Bellfield Dam was inspected en route, and must surely add to the scenic attraction when filled to capacity, which may take considerable time, or perhaps a better season than the past one.

After driving to the turntable on Mount William, the final assault must be made on foot, but if the weather is clear the climb is worth the effort, as the view is superb, with Mt. Elephant, 56 miles away to the south-east, dominating the horizon of Victoria's Western District. It stands like a giant pachyderm from which it is so aptly named.

On leaving Mt. William, the sealed road leads to Dunkeld, and it is almost unnecessary to leave your vehicle to see the wildflowers; as Native Heath in white and several shades of red, Thryptomene, Grevilleas, Acacias, and others grow on or near the roadside until Dunkeld is reached, and the Grampians with Mt. Abrupt and Sturgeon are left behind.

By midday the coastal town of Port Fairy was reached and lunch was had on the Southern Beach, where 2 Pied Oystercatchers always seemed to be in command of the nearby territory and causeway. A few Gannets patrolled beyond the outer surf, and one Golden Plover quietly watched from the rocky foreshore. About 20 Red-necked Stint fed behind the causeway, and later in the afternoon a Boobook Owl was flushed from coastal scrub at Eastern Beach. At Killarney Beach towards evening at least 20 Turnstones were observed feeding amongst seaweed that had been washed ashore, in which they are incidentally, remarkably well camouflaged. Also present were several Hooded Dotterels. Sunday morning the 16th, from the cliff tops at Childers Cove, a large sea bird (and what must surely have been a species of Albatross?) was seen soaring in the troughs of the waves some half a mile out to sea.

As the Great Ocean Road descends through coastal scrub approaching Port Campbell Bay, two Rufous Bristle Birds were seen on the roadside, one bird allowing cars to pass quite close, but would disappear if one approached on foot.

On Sunday evening 16th, as the sun was setting, hundreds of the Short-tailed Shearwater were watched as they returned from the sea to Mutton Bird Island, in the beautiful Loch Ard Gorge area.

Monday morning 17th, a stop was made at Campbells Creek Bridge where a pair of Southern Emu Wrens was seen; also present were some Golden-headed Fantail Warblers and one Sacred Kingfisher, 2 Yellow-tailed Black Cockatoos and a Black-shouldered Kite.

A worthy National Park.

Currawongs at Beechworth

This note on birds from the Beechworth district in Victoria, comes from Mrs. Frances Gladstone. Two of the birds referred to are the Pied, and the Grey Bell-magpies. In most recent books on Australian birds, they are referred to as the Pied and Grey Currawong.

Ever since we have lived here, we have wondered about the flocks of Pied Bell-magpies which come to our property each autumn, to feed on the fallen pears.

In the past, we have wondered from where they come, and to where they go. However, last year, one pair stayed to breed, and built a nest in a Long-leaf Box-tree, close to our property. The nest was a large one, built of leafy twigs and sticks. By November of last year, this pair had raised young ones, which we could hear calling impatiently as the parents hurried back and forth with scraps of food.

Occasionally, the whole flock would come, and stay for an hour or so, before departing and leaving the one pair.

In another tree, not far away, a pair of Black-backed Magpies built their nest; while close by, were a family of Mud-larks, and another of Black-faced Cuckoo-shrikes.

All four families were living quite happily near each other; but if a crow appeared anywhere near the area, all four parents would attack, and drive the intruder far away.

Mrs. Gladstone also asks whether the Pied and the Grey Bell-magpies breed in Victoria?

Yes, both birds do breed in Victoria, building fairly large nests of twigs and sticks, lined with rootlets. 2 to 4 eggs are laid between September and December.

The Pied Currawong does move from the lowlands into the higher areas during spring and summer, and the Grey Currawong at times is nomadic.

Ravens—Scavengers or Killers?

The following note has been received from Mr. John Seebeck, a Research Officer with the Fisheries and Wildlife Department, and refers to an observation made by him and another officer of that Department.

On September 19th at 3.00 p.m., on the Maroondah Highway, just north of the junction of the highway and the Warburton Road, Fred Baum and myself observed a raven attacking an object on the roadside. We went back to have a closer look, and found that the subject of the attack was a domestic pigeon. This bird had been almost completely defeathered on the head and back, and was bleeding from numerous wounds on the head, back and tail, and on the wings. Many feathers were blowing about. The pigeon, well grown, probably sub-adult, was incapacle of co-ordinated movement, and could not have lived long. From a humane feeling rather than a biologist's objectiveness, we killed the pigeon and left it for the raven.

From the description of the injuries to the pigeon, it seems likely that a car had been involved at some stage, and that the raven was acting in its capacity as scavenger. Both ravens and magpies use the roadways as a source for the picking up of food, and magpies in particular suffer great losses due to this habit.

Ed.

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close to nature

How many of us realize just how close we are to nature; and with what little effort it can be studied?

From the fluttering moth at a lighted window, to the spiders in the darkest corner of our garden shed; the wonders of the natural world are numerous—to the careful and patient observer!

This is a series in which a look is taken at some of these creatures which make up this "world in the garden". The aim is not to provide a completely scientific treatise on each subject; but rather to provide enough general detail to stimulate an interest in the things around us.

If the series encourages us not only to look; but to see something in what we are looking at, then it will have served its purpose.

The word "bug" has different connotations for different people—Americans apply it loosely to cover almost all members of the insect world; to the older members of the community, it brings back memories of disturbed sleep in beds infested with bugs; and the intolerant person often uses the word to indicate his annoyance at being bothered by another, with the expression "don't bug me".

Here, however, we shall use the word in its correct sense—that is for the members of the order of insects called Hemiptera. Included in this order are the bugs, cicadas, scale-insects, plant-hoppers, and aphids—a very large group, in which there are something like two thousand species in Australia alone.

The appearance of the insects within this group is vastly different, but they all have one thing in common—a sucking beak which is used to feed on plant, or insect and animal fluids. The beak, when not in use, lies folded flat along the underside of the body between the legs.

Within the order Hemiptera are two suborders. These are the true bugs, the Heteroptera, in which the wings lay flat and are folded across the abdomen; and the Homoptera, in which the wings are held roofwise over the back, and which includes the cicadas and plant-hoppers and the like.

One member of the true bug group, which this year has been fairly plentiful on the foliage of a Cassia shrub in the garden next to my own, is the Crusader Bug (Fig. 1). This is quite conspicuous, with its yellow St. Andrew's cross on its back, and being about one inch in length. On other

Fig. 1. The adult Crusader Bug, showing the St. Andrew's Cross marking. (Note. Three segments of the left antenna have been lost.)

Photo: G. Ward.

parts of the shrub were smaller and differently marked bugs (Fig. 2). When first noticing these, they appeared to belong to perhaps another species; but when realizing that with these insects, as in common with some others like the praying mantis, their growth is accompanied by a series of moults, and only with the final moult do the wings appear, these other smaller bugs, were in fact juvenile forms of the Crusader Bug.

One or two peculiar habits were evident whenever I approached uncautiously towards the insects. The first was a rapid vibration of the orange-tipped antennae, of perhaps 15 or 20 vibrations per second. This vibration appeared to be taken up almost simultaneously by other bugs

Fig. 2. A juvenile Crusader Bug, showing the upper body markings. (Note also the still younger bug, and the wilted young-leaf growth.)

Photo: G. Ward.

in the immediate vicinity, but I imagine that they all saw me together, then started the vibration of antennae; rather than it being passed from one to the other as some form of signalling device.

The other habit was that of circling the particular stem of the plant on which they were feeding, and keeping it between themselves and myself as they climbed upward.

A third habit of these bugs, and one which I am thankful was not inflicted on me, is their ability to direct a stream of odorous liquid from the end of the abdomen, with surprising accuracy. No doubt this serves the purpose of deterring potential enemies when they approach too close to the insect.

An interesting association between a praying mantis and Crusader Bug took place in a friend's garden (Fig. 3). The mantis climbed over the top of the bug, but did not attack it. Whether this lack of attack was due to the comparative size of bug, or because of the discharge of the aforementioned fluid, I am unable to say, but it was an interesting observation.

The effect on the tip-growth of the host plant on which the bugs are feeding, is one of wilting and blackening, rather like frost affected foliage.

Another more commonly noticed bug is of course the Harlequin Bug, which attacks apples and other fruits, and is frequently found feeding on many types of large leaved weeds, par-

Fig. 3. Mantis versus Crusader Bug. The outcome of this encounter appears in the text.

Photo: M. Lampionen.

Fig. 4. Juvenile form of Harlequin Bug, with beak inside a flower of *Lippia nodiflora*. (Note the beginning of wing development.)

Photo: G. Ward.

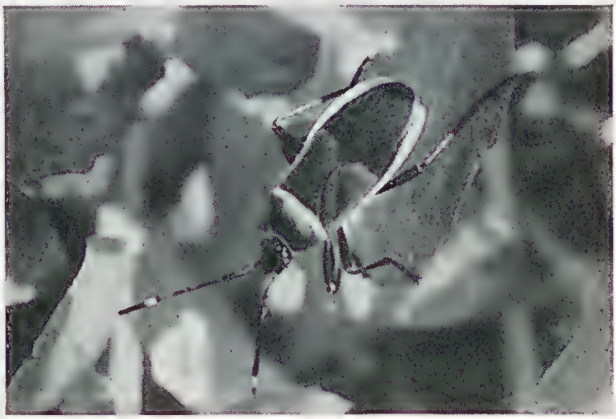


Fig. 5. Adult form of Harlequin Bug.

Photo: G. Ward.

ticularly the marshmallow. Again, we find two insects in association with one another, but of different appearance. This too, is the juvenile and adult form, as shown in figures 4 and 5 respectively.

Here then, I have described two members of the true bug group, but these are not the only members present in our gardens. There are others which we will take a look at in a future article. Meanwhile however, although the word "bug" may have unpleasant associations, let us not ignore them; for there is a great deal unknown about them, and they belong to a large group of which many are of economic importance.

FOR FURTHER READING

Child, J., 1960. *Australian Insects,* Periwinkle Press, N.S.W.

Leach, J. A., *Australian Nature Studies,* Macmillan and Co., Melb.

McKeown, Kieth C., 1942. *Australian Insects,* Roy. Zool. Soc., N.S.W.

————, *Insect Wonders of Australia,* Angus and Robertson, Sydney.

Riek, Edgar, 1963. *Insects of Australia,* Jacaranda Press, Brisbane.

No. 8 Common Objects

By
E. J. LeMaistre

People who own microscopes are often heard to say something along these lines . . . . "It's all very well, I've read the articles on pond life and other subjects, but there are no ponds near where I live and in any case I haven't got a collecting net, pipettes and petri dishes. I put a fly under the microscope but it was too big and too dark, I looked at a leaf but the light from the mirror wouldn't pass through it, so what else can I look at? And it's no good telling me to boil things in acid or soak them in xylol or mount them in balsam, I'm not an expert, I just want to look at things."

Remarks such as these are very typical of people who, with a little intelligent guidance, could obtain a lot of pleasure out of a simple microscope, and then find it was well worth their while going to a little extra trouble, to be able to study the subjects of the articles which they have perused.

So here are a few "common objects" and how to look at them.

Pollen—Take some 3″ x 1″ slips, and gum a ¼ inch square of black paper in the centre of each. Find a flower in the garden which has plenty of pollen, for example, a tiger lily, arum lily, or even a pumpkin flower; and holding the slide gently, tap the flower so that the pollen falls on the black paper. If preferred, take off the pollen with a small brush, and transfer to the black slide. The pollens show under the microscope in their full colour if top lighting is used. If the instrument is not set up for this, simply shine the beam of a torch on to the slide.

Butterfly and Moth Scales—Dust the scales from the wing of a butterfly in the same way as described above for pollens, and use the same viewing procedure. Also, view them on a transparent slide with normal mirror lighting.

Leaves—Some leaves are very interesting when viewed with top lighting. Hairy leaves such as may be found on some of the flat weeds, have stellate hairs.

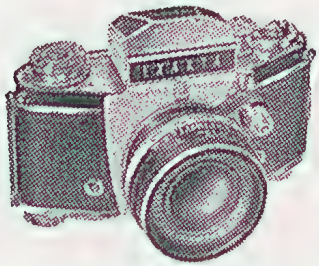
Insect parts—The mistake made by newcomers to microscopy, is in placing a whole fly on the slide, which is like looking at the hide of an elephant with a telescope. Much information can be gained however, if the insect

is studied piece by piece; legs, wings, feelers, and eyes; first using transmitted lighting, and then top lighting. The compound eye of a butterfly, or the proboscis of a blow fly, are amazing, and some insects which have four wings have a series of hooks on one pair which fits over ribs on the other pair, so that in flight they join and function as two wings instead of four.

Small insects—Very small insects such as thrip, tiny fruit flies, and similar types, can be studied whole, and it may help if the insect is viewed in liquid.

Seaweed—Choose some of the very fine types and study them in water. Diatoms are often found growing on the seaweed, and sometimes, small marine animal life may be seen.

Shells—If sand is taken from the mark where high tide reached, and studied carefully, very small shells, Foraminifera, are often to be found. Use top lighting for these also.



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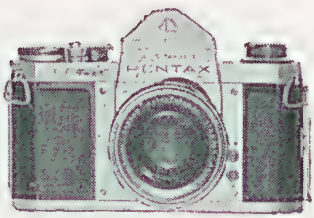

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Book Review

Fantastic Trees

By Edward A. Menninger

(published by Viking Press, New York)
Stiff cloth-cover with dust jacket, 9½" x 6½". 304 pages with half tone plates and line drawings. Price $8.95.

Trees that make Rain — The Man-eating Tree — Trees that Display Affection — Trees that Flap their Leaves.

All these subheadings sound intriguing, and indeed they are; but these are only a few of the trees described in the 34 chapters of this most absorbing book.

Many books which are devoted entirely to Botany, may be used only for reference purposes. Others are designed for use in organizing garden layout or plant propogation. This book however, as well as being written authoritatively, is written for the person with no specialized knowledge of the subject.

Dr. Menninger reveals, in a most pleasing and interesting manner, the eccentrics and oddities of the tree world, which are outnumbered by their more normal and sedate relations.

Combined with the text and photographs, is the realization by the author of the more complex and only partly solved riddles of botany. Why is tree behaviour like human behaviour on occasions? What guides the individual plant in its struggle with change in environment. Dr. Menninger has drawn attention to these facts without losing to the layman, the appeal of the book.

A further attraction of this book, for the Australian reader at least, is the fact that no less than fifteen of our species are mentioned specifically, while reference is made to many others. The old argument as to which tree is the taller—American Sequoia or Australian Eucalypt—is taken up once again, but this time is apparently settled in favor of the Sequoia.

Incidentally, the dust cover design features the Australian Baobab tree.

The book is completed with a very interesting and thought-provoking epilogue, written by the author to his brother. A bibliography of principal publications of reference is followed by a comprehensive set of notes, arranged in reference to each chapter.

This is a book which may be used as an authoritative reference for a number of warmer climate or tropical trees, as well as an addition to the library for the purpose of pleasant browsing.

G.M.W.

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Field Naturalist Club of Victoria

Whilst in course of preparation of this issue, we received the very sad news that our former Secretary, Mr. E. H. Coghill, had passed away.

Here was a man who continued to serve our Club into the last months of his life.

We extend our deepest sympathy to his family and relatives in this difficult time.

General Meeting—10 April, 1967

The National Herbarium Lecture Hall was comfortably filled for the first meeting after the Annual Meeting. The President, Mr. W. Lloyd Williams, opened the proceedings and extended a warm welcome to members and any guests present.

On a motion moved by Mr. J. Strong and seconded by Mr. Woollard, the minutes of the February General Meeting were taken as read.

The President brought to the notice of the meeting the following points.

1. The fact of the April *Naturalist* being the one thousandth issue of the magazine.

2. Mrs. Gladstone had been appointed representative of the club for the Mt. Pilot Reserve.

3. Mr. J. Ros Garnet's successful nomination for the Natural History Medallion of 1966. He also mentioned that Mr. N. McD. Taylor had been reappointed as Honorary Treasurer, and Mr. Blott as Assistant Treasurer.

Correspondence was received, and concerned a report from the Fisheries and Wildlife Department reporting on the setting aside of a reserve for the protection of the Helmeted Honeyeater, in the Woori Yallock Creek area; an application from the Latrobe Valley F.N.C. for further reserves in the area between Anderson's Track and the Railway near Moe; and an extension to the Wildflower reserves near Nayook, by the Forests Commission.

Mr. A. J. Fairhall and Miss Woollard moved and seconded that the correspondence be received.

The guest speaker, Mr. Jack Hyett, was introduced by the President, and before beginning his lecture on Bats, he made mention of the lack of sightings by him of the colony of Helmeted Honeyeaters in the Cardinia Creek area, over the past six months. He also asked that if any member had any information of this colony, to contact him.

Mr. Hyett then began his lecture in his own easy-to-listen-to style, and treated members to a most informative and instructive evening, gently tempered with humour. Among the points mentioned was the fact that only three creatures had employed the use of flapping flight. These were the Pterodactyls of prehistoric times, the birds, and the bats. The difference in bone structure of the upperarm, fore-arm, and digits of these three, was clearly shown by three chalk diagrams. They showed the one very long digit forming the leading edge of the wing on the pterodactyl, the modified three digits of the bird which hold the primary feathers; and the umbrella-like rib arrangement of the digits of the bat, which supports the *patagium*.

To explain how the transition to flapping flight may have taken place, the speaker explained the evolving of the folds of loose skin between the legs and along the body of some of our possums.

Bats almost certainly developed from insectivores, and although many mammals have evolved gliding flight, only the bats have been successful with flapping flight. They belong to a very successful order, for 980 species belong to the Chiroptera. There are two groups within this order, the fruit and nectar eaters, and the insect eaters, and they belong to the Megachiroptera, and Microchiroptera respectively.

There are no true vampires in Australia, although we have the False-vampire or Ghost Bat of Central Australia. This bat is cannabilistic among the smaller members of the order. Our largest bats are mainly found in Queensland, and include the Grey-headed Fruit Bat, which on occasions, does visit fairly southern parts of Victoria.

The smaller bats, in common with smaller birds, have a body temperature problem. Because of the fact that the surface area of small animals is large compared with their volume, bodyheat-loss is quite rapid. There are two methods of controlling this heat loss by bats, one of which involves their living in tropical or equable climates; and the other being by the use of a hibernating period. This is during the day with bats, when they hang upside down with very little body activity.

The legs of the bat are joined with the patagium, and so that synchronization between legs and arms is achieved, the knee joint of the bat bends in the opposite direction to our own.

The flight muscles are not attached to a keel-bone as with birds, but are attached to the rib-cage which is rather flattened and broad. The outwardly turned feet enable the bat to hang inverted.

The skull is somewhat flattened, and the upper jaw bones are reduced in size. The incisor and canine teeth are needle sharp, while the molars and pre-molars have strongly curved cusps. The movement of the jaw when chewing is a side to side shearing movement.

Although not observed often, the birth of a bat apparently takes place with the mother hanging by legs and thumbs, while the infant is born *feet first*. It is then supported by part of the patagium in basket fashion, and then transferred to the teat area.

The eyesight of bats is generally quite good, even in daylight, and a number of experiments have been carried out in an effort to determine their method of finding their way in the dark. This has been resolved as being due to the production by the bat, of high pitched sounds which, on coming into contact with surrounding objects, are echoed back to the super sensitive ears.

With bats as common as they are, surprisingly little work has been done with them, and a great deal of this has appeared in the *Victorian Naturalist*. However, a tremendous amount remains to be investigated, and people such as FNCV members can really do some worthwhile work in this field.

These were Mr. Hyett's concluding remarks, after which the President conveyed his warmest thanks, and asked the members to respond in the usual manner, for a most interesting and inspiring address. This they did.

A number of questions followed, which the speaker answered fully. Also, an interesting comment from Mr.
told of his keeping a bat for three weeks and feeding it on moths. These it manoevered to its mouth with the help of the patagium. He fed it eight moths every evening, but it had no water for the three weeks; although Mr. Hyett stated that bats do drink.

Under General Business, the President informed the meeting that the retired Secretary, Mr. E. H. Coghill, was very ill in hospital.

The new members, as listed in the *Naturalist* for April, were duly elected and welcomed.

Group representatives were invited to speak about their particular coming events, and an invitation to attend meetings was issued from the Mammal Survey Group to all those interested.

The subject for the evening in May was announced, and is to be an address on Polychaete Worms by Mr. R. L. Jensz.

Under the heading of Nature Notes and Exhibits, Mr. D. McInnes asked for volunteers to help with this year's Nature Show, and also that the Hawthorn Junior F.N.C. asked that they be allowed to control the whole of the reptile display.

Another member spoke of an experience which she had had on the Irrawady River in Burma, when what appeared to be leaves on the trees lining the river banks, suddenly came to life and flew into the air, darkening the sky for half an hour—they were bats.

The Exhibits numbered three—some small unidentified shells from Werribee, by E. Dixon; a nymphal skin of the Green Monday Cicada, by M. North; and a specimen of *Marianthus erubescens* from W.A. by Mr. A. E. Brooks.

Botany Group Meeting

With 23 members and visitors present, and Mr. Fuhrer in the Chair, Mr. Bruce Muir spoke on Botanical Collecting; in the course of which he showed us pressed specimens collected by Robert Brown in 1805, and another of maidenhair from the Joseph Banks collection, when Captain Cook first landed at Botany Bay in 1770. This specimen came from the British Museum. There were other specimens reputed to be dated 1696, and came from the Strassburg Herbarium. There was also the Sonder collection, bought by the Government, through Baron Von Mueller, 1870-1873, for £900. These specimens were all in a wonderful condition and easy to identify. Mr. Muir said that one reason for having more than one specimen of any one plant was, in part, to note variations in plants growing in various habitats; and also among those in the one locality as well. In preserving specimens, it is best to press them at once if possible; otherwise, keep them in airtight containers, and if of a very delicate nature, in jars containing a preserving fluid. Also for delicate flowers, it is best to press them between layers of fine plastic foam. When pressing plants or flowers between sheets of paper, it is necessary to change the paper daily, or better still, twice daily until the specimens are fairly dry in order to preserve their colour. Some flowers keep their colour well over the years, but others lose it very quickly.

Geology Group, 1st March

32 members and visitors attended with Mr. Dodds in the Chair.

Mr. Sault reported on the club excursion to San-Remo and Cape Woolamai.

At the San-Remo back beach, members examined the shore platform and cliff formations where sedimentary rocks of Lower Cretaceous age are overlain by older basalt of Oligocene age. Members collected much fossil wood, the replacement mineral of which is, in part, siderite, "Iron Carbonate". Afterwards the party made a brief examination of the pink granite at Cape Woolamai and the older basalt which overlies it in places. The subject for the evening was a talk by Mr. McInnes on "Metamorphic Rocks".

He began by describing *contact-metamorphism*. When slates and shales have been intruded by granite, pieces of country rock are assimilated into the magma around the inside edge of the contact zone. These are known as *xenoliths*, and the predominant mineral as a result of recrystallization is usually biotite. Outside the contact zone, the area is known as the contact *aureole* and may extend for a short or a considerable distance.

The rocks in this area are changed by *thermal-metamorphism* to *hornfels*. Minerals in this type of rock, lie in all directions interlacing with one another, and form a fine grained rock. The minerals are mostly aluminium silicates, the type formed being dependent on physical factors during metamorphism. *Andalusite* is formed at high temperature and low stress. If the stress becomes greater, *Andalusite* will change to *Sillimanite*. Another aluminium silicate, *cyanite*, is a high stress, moderate temperature mineral, found also in metamorphosed argillaceous rocks. Two micas, biotite and muscovite are also prevalent. The speaker mentioned that in the case of limestones, the metamorphic product is marble. Limestone is composed of the hard parts of calcareous organisms, which contain calcite or aragonite; and as these minerals are "weak" minerals, little mineralization takes place when metamorphosed. The speaker then spoke of *regional-metamorphism*. He said that as a result of large scale folding, and concordant intrusion, the formation became segreted into layers. Stresses during this process cause newly formed minerals to have a habit of forming in parallel layers, usually at right angles to the pressure. This may occur along planes of cleavage or bedding, and is termed schistosity. The rocks are thus metamorphosed to gneisses and schists. Gneiss of clay origin is called *paragneiss*; those of igneous origin, *orthogneiss*; and those of sandstone origin *psammite gneiss*. Mica is a predominant mineral in gneiss and schists, biotite being the most common variety. Mica schist is a common metamorphic rock in N.E. of Victoria. Sometimes *biotite* breaks down into *chlorite*, in which case chlorite schists or phyllites are formed. Another mica often found in metamorphic rocks, is sericite, which is derived from the breakdown of *orthoclase*. The speaker quoted cordierite as another common mineral of both gneiss and schist, which breaks down to pinite, which in turn may alter to garnet. Mr. McInnes quoted many more minerals and their alteration product, and was thanked by an enthusiastic audience for his excellent lecture.

Microscopical Group Meetings
January and February, 1967

January

Fifteen members and visitors attended this meeting, and ten microscopes were on display at the bench. Mr. D. McInnes was elected to the post of acting chairman, as Mr. J. Daws was on vacation.

The minutes of the previous meeting were read and confirmed.

Mr. K. Trotter informed the group that it was doubtful if Mr. H. Barratt would be well enough to attend any future meetings, and because he had let his subscription lapse, he would no longer receive copies of the *Naturalist*. He moved a motion that a request be sent to the Council, suggesting, as a mark of recognition for the years of service rendered to Microscopy in the field of Diatomaceae, that the name of Mr. Barratt be returned to the posting list for all future copies of the *Naturalist*. Mr. D. McInnes offered to put this request to the next Council Meeting. It was also decided to call a meeting of the Programme Committee in order to draw up the group's future activities. The committee consisted of Messrs. McInnes, Woollard, Trotter, Strong, Genery (snr.) and Genery (jnr.).

The rest of the meeting consisted of an exhibition and discussion of members' slides which included a number of slides from a box of various specimens of coprophagous fungi, prepared by Mr. H. A. Dade of Benalla. These were shown by Mr. D. McInnes.

An example of the intricate antennae from the male silkworm moth *Bombyx mori* was exhibited by Mrs. Seamens.

Other exhibits were a slide of some silica bodies of difficult identification obtained from Californian diatomaceous earth; a slide of "plates and anchors" (synaptera), and eggs of a brine shrimp fixed in paint.—*Mr. K. Trotter.*

Radula of the limpet.—*J. Strong.*

Some colonial rotifers, a slide of liver fluke from Tanti Creek area, and an adult Dobson fly raised from the larva. *Mr. W. Genery.*

adult Dobson fly raised from the larva.—

February

25 members and visitors attended this meeting which was presided over by Mr. J. Daws.

The minutes were read and confirmed.

Between the last meeting and this, a meeting of the Programme Committee had been held at which the programme for the balance of the year was planned.

Mr. McInnes informed the group that the request regarding Mr. Barratt's copies of the *Naturalist* has been agreed to by the Council. He also raised the point that it would be a good idea if all of Mr. Barratt's drawings of diatoms should be photographed for record purposes, this was agreed to and Mr. J. Daws offered to carry this out.

Mr. McInnes asked for more short articles for the *Naturalist*; however, Mr. W. Genery asked if there was any explanation for the non-publication of his last article which had been in the hands of the editor since August last. Members expressed disappointment and hoped that this omission would be soon rectified.

The evening was one of a general nature, at which slides were selected from the slide library and exhibited under those microscopes at the bench, and discussed by exhibitors. Many of the slides, especially those of diatoms, were in a sad state, with covers broken, objectives carelessly racked down into the balsam, and some in which the objects were missing entirely. Mr. K. Trotter kindly offered to take them home and repair them, or do whatever was possible. This was agreed upon.

The following were the slides and exhibitors:—

Some stained plant sections—Mr. C. Nance.
A type slide of diatoms—Mr. D. McInnes.
A type slide of diatoms—Mr. H. Barratt.
Algae showing some diatoms—Mr. J. Strong.
A fairy fly (slide by Mr. Blackburn)—Mr. P. Genery.
Bee sting—Mr. P. Genery.
Slide of arranged diatoms—Mr. P. Genery.
Spider, whole—Mr. J. Daws.
Spinarette of spider—Mr. J. Daws.
Marine diatoms—Mr. K. Trotter.
Tectites—Mr. K. Trotter.
Tectites—Mr. K. Woollard.
Epistylis—Mr. W. J. Genery.
Larvae and eggs of Pulex irritans—Mr. W. Genery.
Arteminis salinis—Mr. W. Genery.
Cross section of plant stem—Mrs. F. Seamens.
Cross section of rush stem—Karl Meyer.

F.N.C.V. DIARY OF COMING EVENTS

GENERAL MEETINGS

Monday, 8 May—At National Herbarium, The Domain, South Yarra; commencing at 8 p.m.

1. Minutes, Reports, Announcements. 2. Correspondence.
3. Subject for the evening: "Polychaete Worms"—Mr. R. L. Jensz.
4. Election of New Members.

(a) *Ordinary:*
Miss Florence B. Murray, 13 Gaynor Court,, Malvern SE 4. (Interest—Reproductions in Molluscs.)
Dr. Mona Blanch, Kallista, Vic.
Mr. David McKelvey, 11b Smithdene Ave., Ringwood East. (Interest—Botany.)

(b) *Joint Ordinary:*
Mr. David and Mrs. Diana Sewel, Flat 2, 16 Canterbury Road, Camberwell. (Interest—Botany and Microscopy.)

(c) *Country Member:*
Mrs. R. P. Knight, Cairnoorat Private Mailbag 5, Terang, Vic.
Mr. George A. Broadway, "Taworri", 62 Campbell Street, Castlemaine.

5. General Business.
6. Nature Notes and Exhibits.

GROUP MEETINGS

(8 p.m. at National Herbarium, unless otherwise stated)

Thursday, 11 May—Botany Group. Mr. R. V. Smith will speak on "Weeds".

Wednesday, 17 May—Microscopical Group.

Friday, 26 May—Hawthorn Junior F.N.C. meeting in Hawthorn Town Hall at 8 p.m.

Thursday, 1 June—Mammal Survey Group. This group meets in the library of the Fisheries and Wildlife Dept., Flinders Street Extn., at 7.45 p.m.

Friday, 2 June—Preston Junior F.N.C. meeting in the Rechabite Hall, 251 High Street, Preston (north from Bell Street), at 8.00 p.m.

Monday, 5 June—Marine Biology and Entomology Group. This group meets in Mr. Strong's rooms at Parliament House at 8.00 p.m. Enter through private gate at south end of building.

Wednesday, 7 June—Geology Group.

Thursday, 8 June—Botany Group.

F.N.C.V. EXCURSIONS

Sunday, 21 May—Coimadai. This excursion will be led by members of the Geology Group. The coach will leave Batman Ave. at 9 a.m. Fare $1.80; bookings with Excursion Secretary. Bring one meal and a snack.

Thursday, 31 August, to Sunday, 10 September—Broken Hill. The party will leave Melbourne on 31 August, staying overnight at Mildura, and reaching Broken Hill on Friday 8 September, with day trips in conjunction with the Barrier F.N.C. An extra day will be added to the return journey, to avoid a late arrival in Melbourne. The cost will depend upon the number going, but it is not expected to exceed $100 inclusive (lunches excepted). Bookings should be made with the Excursion Secretary, accompanied by $10 deposit, with the balance to be paid by the end of July.

Field Naturalists Club of Victoria

Established 1880

OBJECTS: To stimulate interest in natural history and to preserve and protect Australian fauna and flora.

Patron: His Excellency Major-General SIR POHAN DELACOMBE, K.B.E., C.B., D.S.O.

Key Office-Bearers, 1967

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MEMBERSHIP

Membership of the F.N.C.V. is open to any person interested in natural history. The *Victorian Naturalist* is distributed free to all members, the club's reference and lending library is available, and other activities are indicated in reports set out in the several preceding pages of this magazine.

Rates for January-December 1967 are:

Ordinary Membership	$5.00
Country Membership (over 20 miles from G.P.O., Melbourne)	$4.00
Junior Membership (under 18 years)	$2.50
Subscription to the *Victorian Naturalist* (non-members)	$4.00

All subscriptions should be made payable to the Field Naturalists Club of Victoria and posted to Mr. R. L. Smith, 430 Little Collins Street, Melbourne C.1.

Note: The currency of the present club year and Volume 84 of the *Victorian Naturalist* is from January to December, 1967.

Brown, Prior, Anderson Pty. Ltd., 5 Evans Street, Burwood, E.13.

the VICTORIAN NATURALIST

Vol. 84, No. 6 JUNE, 1967

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This is a photograph taken by A. H. E. Mattingley in 1933. It portrays the Helmeted Honeyeater, which will be the subject of an article to appear in the *Victorian Naturalist* for next month.

The Victorian Naturalist

Editor: G. M. Ward

Vol. 84, No. 6 8 June, 1967

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Front Cover:

The cover illustration for the 1000th issue of the *Victorian Naturalist*, depicted the trunk of a River Red Gum in Wyperfeld National Park. This month, the cover illustration shows the whole of "Old Be-al".
Allen Owen as the photographer.

Some Littoral Plants of Flinders Island

By Peter Saenger*

The coastline of Flinders Island consists mainly of steep sandy beaches alternating with rocky headlands, mostly of granite. However, there are limestone reefs and cliffs at Settlement Point, and a small limestone headland on the northern shore of Tanners Bay (see Fig. 1). Both these localities proved to be rich collecting areas.

At Settlement Point, Neptune's necklace *Hormosira banksii,* the brown bubbleweed *Colpomenia sinuosa* and *Padina fraseri* constitute the main plant cover in the shallow water; while *Caulerpa brownii, Codium galeatum, Ecklonia radiata* and *Cystophora* spp. form the deep water elements. It was here in the sheltered rock-pools that the green crustose alga *Dictyosphaeria sericea* occurred.

In the deeper water around Settlement Point, large areas of the sea nymph *Cymodocea antarctica* are to be found. Another angiosperm known as the Marine Fibre plant *Posidonia australis,* forms extensive areas which may become exposed at low tide. These can be seen at numerous localities but are particularly striking offshore from Lady Barron, and between Cape Barren and Long Islands. In January, vast numbers of the opened capsules of this plant are washed up on the beaches around Flinders Island. When the leaves of this plant decay, the leaf fibres are rolled into close balls by the wave action and these may be found washed up on the beaches in a variety of sizes. A third angiosperm occurs at Cameron Inlet, on the east coast of Flinders Island. Here the grass wracks *Zostera muelleri* and *Z. tasmanica,* so common on Victorian shores, occur in small patches.

The area displaying the clearest zonation both of animals and plants was the granite headland on the east coast overlooking Babel Island. Rochford (1957) shows the "east Tasmanian" surface water mass extending from the Tasmanian east coast to the southern tip of Flinders Island, but indicates a strong, seasonal fluctation in its position. In March, this cool surface water mass appears to be at its most northern position and is shown to influence coastal temperature and salinity of the southern half of the coast of Flinders Island. This "east Tasmanian" water mass has a temperature in March of 14·2°C (Winter, 12°C; Summer, 16-18°C); while at the same time the waters of Northeastern and Eastern Bass Strait are at 16·8° and 19·5°C respectively. However as Guiler et al. (1958) point out, the water temperatures become higher offshore, owing to the influence of the warm, southward-flowing East Australian current, so that 30 miles east of Babel Island the summer temperatures are 18-19°C, while in winter they are just over 13°C. This somewhat

* Botany Department, University of Melbourne.

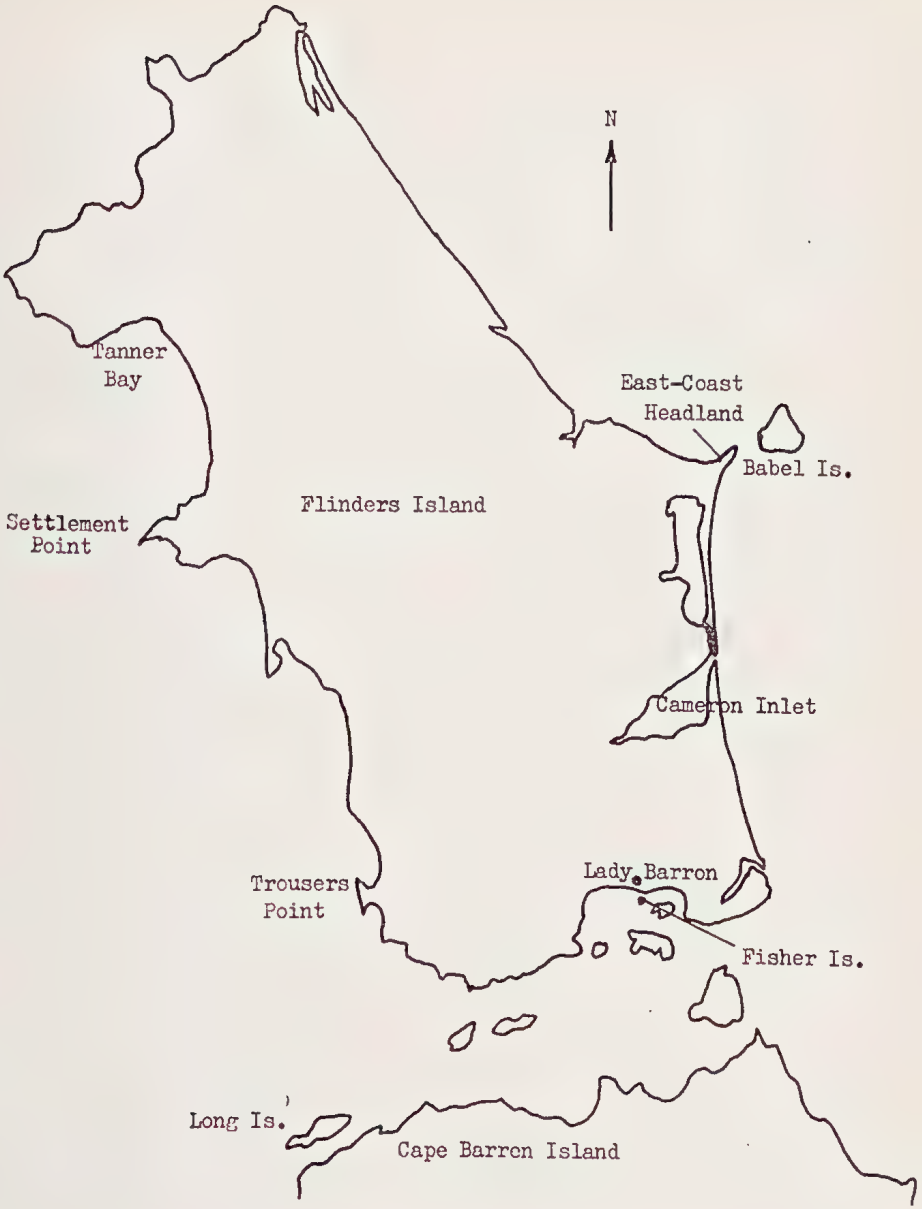

Figure 1 showing position of localities mentioned in the text.

colder belt of water lying close to the east coast of Flinders Island allows a rich algal flora to develop.

The constant battering of waves on this headland is reflected by a large spray zone characterized by the small, light-blue periwinkle *Melaraphe unifasciata*. Below this zone a dark band consisting of two lichens *Lichina confinis* and *Verrucaria* sp. is conspicuous. At high water mark a diffuse barnacle zone occurs, consisting of at least two barnacle species. This is followed by a zone consisting almost purely of the sea lettuce *Ulva lactuca* and the brown alga *Scytosiphon lomentaria*. A narrow but conspicuous band of the green alga *Codium galeatum* occurs below the *Ulva* zone, especially in more exposed areas. In more sheltered habitats, this *Codium* zone appears to be replaced by a *Dictyopteris-Wrangelia* zone with a few small patches of the tube worm *Galeolaria caespitosa*. It is in this zone that large numbers of the black elephant snail *Scutus antipodes* and the mutton fish or abalone *Haliotis ruber* were observed.

In the lower littoral region the sea-squirt *Pyura stolonifera* occurred, followed by a band of the southern bull-kelp *Durvillea potatorum*, a species of cold water affinities (Fig. 2). The kelp *Macrocystis angustifolia* and several *Cystophora* species occurred in the deeper rock pools. Two species of cold water affinities, *Durvillea antarctica* and *Macrocystis pyrifera*, are absent on Fisher Island (Gillham, 1965), but are found on Tasmanian coasts (Guiler, 1952). These two species were also absent on Flinders Island.

However Gillham (1965), states that on the northern coast of Fisher Island, members of the Siphonales become conspicuous, among them *Caulerpa cactoides, C. simpliciuscula, C. sedoides* and *Codium muelleri*. Without exception, the *Caulerpa* species mentioned were not observed on Flinders Island, and as these *Caulerpa* species are usually temperate water indicators, their absence suggests that the waters around Flinders Island may be significantly cooler than Victorian waters where these *Caulerpa* species are common, but not cold enough for *Durvillea antarctica* and *Macrocystis pyrifera* to grow.

Guiler et al. (1958, p. 181) concludes from evidence at Fisher Island that the "apparent reduction in the size of cold water loving species such as the southern bull-kelp . . . . points to a slight warming of the cool water". Although no such reduction in size was observed at this east coast locality, the fact that *Macrocystis angustifolia* and *Durvillea potatorum* are apparently absent at other localities on Flinders Island, seems to support his conclusion that "all dominant species are cold temperate in affinities, but the warm temperate element is very much stronger at Flinders Island than in Southern Tasmania" (p. 181).

Acknowledgements:

The hospitality of Mr. J. Tierney and family of Memana, Flinders Island, is gratefully acknowledged.

BIBLIOGRAPHY

Gillham, M. E. (1965). IV. Vegetation: Additions and Changes—The Fisher Island Field Station. *Pap. Proc. Roy. Soc. Tas.* **99**: 71-80.

Guiler, E. R. (1952). The marine algae of Tasmania check list with localities. *Pap. Proc. Roy. Soc. Tas.* **86**: 71-106.

Guiler, E. R., Serventy, D. L., and Willis, J. H. (1958). The Fisher Island Field Station—With an account of its principal Fauna and Flora. *Pap. Proc. Roy. Soc. Tas.* **92**: 165-183.

Rochford, D. J. (1957). The Identification and Nomenclature of the Surface Water Masses in the Tasman Sea (data to the end of 1954). *Aust. J. Mar. Freshw. Res.* **8** (4): 369-413.

APPENDIX

List of Littoral Marine plants collected during January-February 1967. (This list is nowhere near complete but may serve as a basis for further work. Unfortunately no seasonal changes in species occurrences has been incorporated.)

Angiosperms:

Cymodocea antarctica
Posidonia australis
Zostera muelleri
Z. tasmanica

Lichens:

Lichina confinis
Verrucaria sp.

Chlorophyceae:

Caulerpa brownii
C. flexilis
Codium australicum
C. galeatum
C. lucasii
C. pomoides
C. spongiosum
Dictyosphaeria sericea
Enteromorpha sp.
Ulva lactuca

Rhodophyceae:

Corallina officinalis
Dicranema grevillei
Gelidium pusillum
Jania fastigiata
J. micrarthrodia
Laurencia botryoides
Lithothamnion sp.
Nemalion helminthoides
Phacelocarpus labillardieri
Plocamium preissianum
Wrangelia plumosa

Phaeophyceae:

Colpomenia sinuosa
Cystophora torulosa
Cystophora spp.
Cystoseira sp.
Dictyopteris muelleri
Durvillea potatorum
Ecklonia radiata
Ectocarpus sp.
Halopteris spicigera
Hormosira banksii
Macrocystis angustifolia
Notheia anomala
Padina fraseri
Phyllospora comosa
Sargassum undulatum
Sargassum sp.
Scaberia agardhii
Scytosiphon lomentaria
Seirococcus axillaris
Sphlachnidium rugosum
Zonaria crenata

Cyanophyceae:

Rivularia australis

F.N.C.V. Publications Available for Purchase

FERNS OF VICTORIA AND TASMANIA, by N. A. Wakefield. The 116 species known and described and illustrated by line drawings, and there are 30 photographs. Price 75c.

VICTORIAN TOADSTOOLS AND MUSHROOMS, by J. H. Willis. This describes 120 toadstool species and many other fungi. There are four coloured plates and 31 other illustrations. New edition. Price 90c.

THE VEGETATION OF WYPERFELD NATIONAL PARK AND A CHECK LIST OF ITS VASCULAR FLORA, by J. Ros Garnet. Coloured frontispiece, 23 halftones, one hundred line drawings of plants and a map. Price $1.50.

Address orders and inquiries to Sales Officer, F.N.C.V., National Herbarium, South Yarra, 3141, Victoria. Payments should include postage (4c on single copy).

Naturalists' Records

By H. A. Dade

Observations made by amateur naturalists have much potential value, and are worth recording systematically to facilitate future reference to them. The system which is now in almost universal use for this purpose is a very simple one, adaptable to all branches of biology, and equally suitable for both great research establishments and for the most modest amateur. The writer devised the system over 40 years ago soon after beginning field and laboratory research in West Africa, and later introduced it to the Commonwealth Mycological Institute at Kew (England). Subsequently he found that it had been evolved independently by several other biologists, both amateur and professional, a fact which indicates how practical it is and how obvious in principle.

The key to the system is a register in which a serial number is allotted to each *collection*. The word "collection" is used here in a broad sense to apply not only to natural objects but also, in other cases, to observations. Members of this club who study birds do not collect birds, but they *do* collect a great deal of information about birds. A student of aquatic organisms will, however, legitimately collect algae, insects, and microscopical organisms from dams or billabongs, and will take them home for examination and preservation.

You may give your register any appropriate name. The writer's first register was called his "Case Book" because it concerned cases of plant diseases. In the great fungus herbarium of the C.M.I., it is called the "Accession Book", and consists of an impressive row of large leather-bound ledgers, with serial numbers now in six figures.

The serial number which identifies a collection is attached to all records: detailed notes, drawings, photographs, preserved material, microscope slides, etc., and is the clue which enables the worker to find, easily and quickly, all references in his records. The figures of the number should be preceded by a capital letter or letters of some significance. They could be the naturalist's initials, or the initials of an institution, which will serve to identify the source of the records. An example, chosen at random, is "CUP", indicating that the collections are in the Department of Plant Pathology of Cornell University.

The register can be any kind of note book or exercise book. In practice, the writer now uses 8″ x 5″ notebooks in which rough entries are made over a period of days or weeks until work on a particular collection is finished. Later, at some convenient time, he makes a fair copy in thick exercise books with stiff covers. It is not necessary, and is even undesirable, to use loose-leaf books. Entries extend over pairs of facing pages; at the left hand of each page a narrow column is ruled off. In this column on the left hand page the serial number is entered, e.g., "X.135", and against it are written the usual essential collection data, i.e., the nature of the material collected, the locality, date, and collector's name (friends and correspondents may contribute specimens

or data, or consult, or ask for identifications). It is neither necessary nor desirable to add further details, though sometimes there may be added a note on weather or other environmental factor. In the narrow column on the right hand page a series of small letters, "a, b, c" etc., is entered, one for each organism observed or found in the collection. This letter completes the serial identification number, e.g., "X.135.c"; against it the name of the organism (if known) is written. If it is not known, the generic name, or that of any larger taxon, is entered, followed by "tax. sp. I (or II, and so on)": this will serve as its temporary designation pending full identification, when the correct specific binomial can be written in.

Detailed notes should not appear in the register: their proper place is in record books where full accounts are kept. All books other than the register should be in the form of loose-leaf files, which provide for expansion and the interpoliation of ever increasing accumulations of information. An inexpensive and very useful form of loose-leaf binder is the simple quarto kind used by high school students, each unit consisting of two stout cardboard covers and two brass screw posts. Starting with ½" posts, one can change to ¾" posts or longer ones as the file thickens. Punched sheets can be obtained from stationers, or plain sheets can be punched with a small machine.

The next instrument in the system is an Index. This is an alphabetical list of the specific names of organisms, preferably one sheet per species. Under each heading the serial numbers of each collection is written in. Usually no further details are necessary, though in certain cases an extra item of information may be usefully added: e.g., in the case of parasites which attack more than one host, it is often desirable to add, following the number, "on (name of host)". This Index should be given an appropriate title, such as "Fungus Index", "Bird Index", or "Insect Index". This Index brings together clues to all collections of each species.

Sometimes it is an advantage to have a second Index. A working plant pathologist will want to keep a Host

V.618	Dung of ringtail possum, Cumberland Falls, Vic., coll. G.A. Crichton, 3.2.67. Incubated 24.2.67 Coll. during long hot spell, incubated during cool change which followed. Note effect on flora (d).	(a) Penicillium claviforme, 'drumstick' conenia. (b) Ascobolus viridulus, numerous apothecia, normal (c) Ascophanus subfuscus, dark (Obsis) (d) Rhyparobius polysporus, first appearance since hot weather set in. House temp. 21-24°C. (e) Podospora tax. sp. III. Dense. (f) Sporormia australis. (g) Trichodelitschia bisporula (small form usual on possum dung). (h) Sordaria fimicola

A specimen entry from the writer's Register of coprophilous fungi. These records are cross-indexed in an Index of Fungi, and detailed notes on the fungi appear in taxonomic files and ecological observations.

Index as well as a Parasite Index. In the first he will find all the parasites recorded on each particular host; in the latter, all the hosts attacked by a particular species of parasite will be listed together. In special cases, other indexes may be required. A friend of the writer who was an expert on the Diatomaceae kept a Locality Index in which was entered all the species of diatoms from, for example, the Arafura Sea and the famous fossiliferous sites in New Zealand.

Detailed notes should be kept in separate files, together with drawings, photographs, and correspondence. It is best to arrange these notes in taxonomic order, according to the system of classification approved by the worker. New records of hitherto unrecorded species can be inserted in their proper places. As time goes on, some rearrangement of these files will become necessary, as, for example, when names are changed according to new conceptions of relationships, or when identifications are found to be faulty. As records accumulate, it is convenient to increase the number of files, giving each the title of the relevant taxon, Order or Family.

Another aspect of the naturalist's work is more generalized. This will include observations on ecology, or on migration patterns, on experimental methods, apparatus, or microtechnique, and all kinds of phenomena which affect all the organisms, data which would be lost or very difficult to find if written only in notes on specific organisms. Such notes should be kept in another file or files; they become more interesting as time passes and the accumulated information may then suggest new lines of thought and investigation. Such data as reaction to substratum, types of soil, temperature and humidity, may not be suspected, and cannot be demonstrated, until a large volume of information has been collected.

All material evidence, like preserved specimens and microscope slides, which cannot be stored in files, should bear identity numbers, which will at once relate them to all records concerning them.

It is important to avoid overorganization, a common disease of this age. Very elaborate systems are often attractive, but prove to be a great nuisance, causing much time to be wasted on operating the system instead of being employed usefully in constructive thought and research. The method which has been described is even simpler than it may seem, it is elastic, and can be modified to suit any kind of biological work.

Correction

In the *Victorian Naturalist* **84**, (5): 138, 139, the two photographs were credited to J. Ros Garnet. In fact, Miss D. Nason of Wangaratta, was the photographer.

Also, in the general report of the April Meeting on page 160, column 2 at line 16, the name of Morley should be entered after Mr.

The Story of the "Welcome Stranger"

By T. F. Zirkler

Late last year members of the Geology Group made a visit to Dunolly and Moliagul and heard retold the fascinating story of the Welcome Stranger nugget.

It would perhaps be interesting to retell the events surrounding the finding of this giant; claimed to be the biggest ever.

The stories are many in Dunolly, and the years have certainly not detracted from the story of the find. They tell you of the many nuggets found in the boom days, and those that are still there waiting.

Members of the F.N.C.V., sad to relate, found none. The "big one" though, is there, in replica, in the town's Historical Museum, which was visited—2,332 ounces of it, and sold by the lucky finder for £10,000. Today's value, would be perhaps $70,000.

In 1869, Jack Deeson had a little farm at Moliagul, not far from Bull Dog Gully, where he lived with his wife and family. He was a strongly built man, and had, as was the custom in those days, a full black beard. With the Deesons lived Dick Oates, a single man, who, like his mate, sported a full beard.

They both came from the same county in England, and eked out a precarious livelihood, farming, and fossicking for gold. They were mates and what one had, the other shared. Things had been going badly, and Deeson owed money, and was being pressed for it. This hot February day in 1869 was to change all that.

Oates was ploughing, and Deeson decided to do a little scratching down the gully. He put his pick and shovel on his shoulder, picked up his billy, and walked off in a north-easterly direction from the house. He reached the gully, selected a likely spot near some ironbark trees, and started work. He only worked for a short time when his pick handle broke. Muttering to himself, he stooped down to retrieve his pick head, and caught the glint of gold where his pick had struck. He scraped away some dirt, and there, before his eyes was the huge nugget. Covering up his find he hurried back to the house for assistance. Telling his wife he wanted Dick, he hurried back to the gully.

Oates soon arrived, and the two men managed to prize the nugget loose, and get it back to the house. As it was the end of the week, with the bank in Dunolly being closed, they decided to hide the golden prize, because of fear of theft. They decided on the plan of putting it in the fireplace. This they did, first removing bricks, and afterwards carefully replacing them, and lighting a fire. Next day was Sunday. Much to the men's consternation, visitors arrived. Not a word was spoken of the gold, and what the visitors thought of the fire burning in the fireplace on that hot February day is not recorded.

It was Tuesday before they got the nugget, well covered with bags, on to a dray and on the road to Dunolly, 12 miles away. They pulled up at the London Chartered Bank in the main street, and leaving the dray well guarded, entered.

"How much a hundredweight are you giving for gold today?" Deeson asked.

"How much a pennyweight?" countered the bank manager.

"Well yes!"

They were told.

"How much an ounce?"

Again they were told; it was a little under £4 an ounce.

"Well! How much a pound?" Deeson asked.

This was too much for the banker.

"Bring it in men, bring it in!" he said.

They staggered in with it, and put it down on his desk. Then came the problem of weighing the gold. No bank scales were ever designed for such a task. After discussion, it was decided to cut up the nugget. A short distance away was the local blacksmith's shop; so once more the nugget was loaded on the dray, and Deeson and Oates, accompanied by the banker and some friends, who by this time had been let into the secret, made their way along the street. The nugget was placed on the anvil and the 'smith got to work. Small chips of gold began to fly, and some of these were given to watchers. At least one, according to the story, is cherished today by a local resident. The anvil itself, is now on exhibition in the local museum.

What of the men involved?

Oates returned to England with his share, and married. Later he came back to Australia and settled near Bendigo. There are still Deesons living near Dunolly.

Who named the "Welcome Stranger"? No doubt in grateful thanks to "Lady Luck" it was Deeson and Oates.

The "Welcome Stranger"

Photo: T. F. Zirkler

(By courtesy of National Museum of Victoria)

Chats Found in Victoria

By Roy Wheeler

Of the three species of Chats—family Epthianuridae—found in Victoria, one is quite common, and found in all parts of the State; the other two are spring and summer migrants, one being fairly regular in appearance, while the other is spasmodic, and at times long periods occur between visits.

The common species is the White-fronted Chat (*Epthianura albifrons*) which is illustrated. It is a small black and white bird, about 4½ inches in length. The male is a brightly coloured bird, whereas the female is duller, and tends to lack colour at all in this family. The male of this species is black on the back, tail, and crown of the head. It has a black band across the chest, and the wings are brown, with the tail tipped white. The forehead, sides of the head, throat, and the abdomen are white. The female is much duller, with no black on the head, and the breast band is dark brown and rather narrow. Both have black legs and beak.

The White-fronted Chat inhabits plain country, samphire and tidal flats, coastal sandhills, edges of swamp and lakes, and generally open country. They are gregarious, and their call is a metallic "tang". The nest is cup-shaped and usually placed in the centre of a tussock, small bush, or thick grasses; and is made of grass and twigs with very little lining. The three eggs are white with reddish-brown spots, particularly on the larger end. It is a very early breeder, at times nesting throughout the winter, although spring is the normal nesting period. Their food consists of grubs, caterpillars, and all kinds of insects. They are great exponents of the broken wing act when the nest is approached.

The Orange Chat (*Epthianura aurifrons*) is a fairly regular spring and summer migrant to the north-west of Victoria, and is mainly confined to salt-bush plains and other dry areas in the Mallee and the Wimmera districts. The male is a most attractive bird, with an orange-yellow crown and rump, and a black chin and rich orange-yellow underparts. The wings and back are greenish-yellow and streaked with brown, while the tail is black with a white tip, and the wing quills greyish. The female is much duller in colour and lacks the black throat. Both birds have black beaks and legs, and are about 4 inches long. They also build a cup-shaped nest of roots and grasses, usually in low bushes or grasses, and the three white eggs are spotted with purplish-red. I have seen this species at Karawinna near Mildura, and at Mt. William near Mystic Park. They are fairly regular visitors to Mildura, Hattah Lakes National Park, the Jeparit district, and Mystic Park–Lake Charm area. The call is higher pitched than the other two species.

The Crimson Chat (*Epthianura tricolor*), visits the State at most infrequent intervals of sometimes up to 20 years, and again mainly in the north-western part of the State. The male bird has a brown back with dark

White-fronted Chat at Nest

Photo: C. E. Bryant
(Block by courtesy of R.A.O.U.)

streaks and brown wings with whitish edges to the feathers. The crown, rump and chest are scarlet. The tail is tipped white, the abdomen is white, and the sides of the head are brown. The female is brown with a buff coloured chest, and the rump is reddish. Both birds have black beaks and legs, and are about 4 inches in length. The male is a very brilliant scarlet, and a very beautiful creature. The nest again is cup-shaped, and the birds usually nest in parties in low bushes or grasses, or in vines; as they did at Rutherglen many years ago. The three eggs are white with purplish-red spots. Their food, like the other Chats, consists of grubs, caterpillars, and insects. The call is a metallic "ting".

According to Alan McEvey's fine paper on "The Birds of the Rutherglen District" *Emu* Vol. 65, Part 1, he quotes A. G. Campbell as saying that in September 1899 he saw a few Crimson Chats in the district; but in the spring of 1896, it was stated that these birds arrived in the district in great numbers, and nested among the vines and the open vineyards. In 1911-12, the Crimson Chat was again reported flocking and breeding in the vines at Lilliput, just south of Rutherglen. These are the only reports I know of birds being recorded outside of the north-west of the State.

At Benetook near Red Cliffs, the Crimson Chats appeared and nested in October, 1965—the first time for 20 years. At that same period, this species was reported at Swan Hill, Lake Boga-Tresco area, Wyperfeld National Park, and at Lake Albacutya. The invasion therefore was fairly widespread. At Swan Hill, Mr. George Southwell sent in some interesting notes on a small group nesting between the airstrip and Lalbert Road. Six nests were in horehound bushes, and another in a heap of brambles; and all beside the road. The male bird seemed to do a full share of both, sitting and feeding, and it was noticeable that the female only showed her patch of crimson to full advantage when doing the broken wing act, in a desperate attempt to lead one from the nest. The tragic part about it was the mortality rate of 100 per cent. The chicks seemed to disappear one at a time when they were almost fully fledged, and the last one was found dead in the nest. Mr. Southwell often wondered if insecticides had something to do with the deaths, as the parents collected food for the young from around the vines.

The first record made for the Park by Mr. H. E. Tarr (Chairman of the Wyperfeld National Park Committee) was on 23 October, 1965. On 7 October, 1965, Mr. Henry Hobson of Rosebery saw four birds at Lake Albacutya. One was a brilliant male, and another a male coming into colour. Mr. Hobson is of the opinion that the Crimson Chats bred in the area in September 1955 when a fledgling was caught by children at a school picnic. In October 1961 Mr. Hobson saw a pair on his farm, but they only remained one day.

Thank You

Members of the F.N.C.V. Council, on behalf of all members of the Club, wish to thank those who sent their congratulatory messages on the occasion of the publication of the 1000th issue of the *Victorian Naturalist*.

A Victorian specimen of the Little Red Flying Fox *Pteropus Scapulatus*

By John L. McKean* and K. G. Simpson†

Recently, while examining and measuring bat specimens in the collections of the National Museum of Victoria, Melbourne, we discovered a specimen of the Little Red Flying Fox, *Pteropus scapulatus* (Pteropodidae, Megachiroptera). It was incorrectly labelled *P. poliocephalus*—the Grey-headed Flying Fox.

The specimen, which is in spirit, is registered as NMV No. C921; it is a female collected on June 21, 1943, at the Burnley College of Horticulture, Burnley, a suburb of Melbourne. As far as we can discover, this is the only specimen of *P. scapulatus* taken in Victoria that has been preserved in an institution.

Periodically, there are years when flying foxes disperse far more widely to the south and west than usual. The normal range of *P. scapulatus* does not include much of Victoria, except perhaps the far eastern part of the State. Ratcliffe (1931; 1932), wrote that the species extends south to the Victorian border. This statement was based on questionnaire answers received from fruit-growers, which indicated that the Little Red Flying Fox was present in the Eden district, New South Wales, during the summer of 1926 to 1927 (F. N. Ratcliffe, pers. comm. 1966).

Morrison (1943) stated that both species visited and raided orchards between Mallacoota and Orbost nearly every year. He recorded widespread occurrences of flying foxes in the summer and autumn of 1943 in both metropolitan and northern Victorian areas. A specimen of *P. scapulatus* was taken alive at Koondrook, Victoria, and photographs of the animal accompany Morrison's article. The inference from reading this article is that *P. scapulatus* was the cause of damage to orchards at Euroa and Kyabram in Victoria, and at numerous centres in New South Wales, including places as far west as Roto Station, Griffith, Leeton, and Tilpa. Pizzey (1963) has apparently drawn on Morrison's article in a recent popular account of flying foxes. Nelson (1965) also records *P. scapulatus* as occurring in Victoria without citing any references or instances. McQueen (1965) suggests that it is a common visitor, but again no records are given.

There would seem to be little doubt, however, that the specimen of *P. scapulatus* from Burnley was part of the widespread 1943 influx.

A specimen of *P. scapulatus* in the collections of the South Australian Museum, registered on May 12, 1946, and allegedly collected at Stunsail Boom, Kangaroo Island, South Australia, is considered at the present time to be an erroneous record (P. Aitken,

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† 27 Kingswood Drive, Dingley, Victoria.

pers. comm. 1966), or at least one requiring confirmation.

Normally, *P. scapulatus* can be readily distinguished from *P. poliocephalus*, the species most commonly and regularly recorded in Victoria, by its smaller size, brown wing membrane, and uniform reddish-brown or light chocolate pelage colouration. *P. poliocephalus* has the lower back and belly a greyish-buff, and has a conspicuous tawny or ginger collar extending around the neck and across the upper back. The wing membrane is blackish and the head colouration is normally grey.

Acknowledgements

We are grateful to P. Aitken of the South Australian Museum for information, and to the Director, J. McNally, and Scientific Officer, Miss J. Dixon, of the National Museum of Victoria for access to their collections.

References

McQueen, R. H. J. (1965). Fruit Bats. *Vict. Nat.* **82**: 47-8.

Morrison, P. C. (1943). Inland drive of the Flying Fox: an interesting problem in habitat. *Wild Life* **5**: 85-7.

Nelson, J. E. (1965). Movements of Australian Flying Foxes (Pteropodidae; Megachiroptera). *Aust. J. Zool.* **13**: 53-7.

Pizzey, G. (1963). Little red peril. *Animals* **2**: 654-57.

Ratcliffe, F. N. (1931). The Flying Fox (*Pteropus*) in Australia. *C.S.I.R. Bull.* **53**: 1-81.

Ratcliffe, F. N. (1932). Notes on the Fruit Bats (*Pteropus* spp.) of Australia. *J. Anim. Ecol.* **1**: 32-57.

Mammal Survey Group

Mammals of the Metropolitan Area

In addition to the surveys being undertaken further afield, the Mammal Survey Group is commencing a survey of the mammals of the Metropolitan area. This will be based largely on locality records for mammals in the Melbourne suburbs, with attention being directed initially at the two possums common in Melbourne, the ringtail *Pseudocheirus lanuginosus* and the brushtail *Trichosurus vulpecula*.

The group therefore requests all F.N.C.V. members for help. Reports of sightings of either of these possums (or any other non-domestic mammal) would be greatly appreciated in expanding our records. All data will be plotted on a map of the Melbourne area. Specific details of localities are needed, so that they can be pin-pointed in a street directory, with details of date, time of day and surroundings.

Information should be sent to the Hon. Secretary, Mammal Survey Group, 36 Percy St., Balwyn.

Readers' Nature Notes and Queries

These columns are available for all members, young and old, to bring before others their own observations in nature. Correspondence may be sent to the Editor, 54 St. James Road, Heidelberg.

The Editor's file of Nature Notes is still very thin; please endeavour to refill it as soon as possible. Everyone, including the Junior Members is encouraged to contribute.

Suburban Birdlife

This most encouraging report of suburban birdlife comes from Robert Marston of Reservoir in Victoria.

(The area involved is one which I know fairly well, but alas, suburban development is closing in rapidly. Ed.)

On May 14th, while birding at Rosanna, about ½ mile north of the Banyule Homestead, I was watching a flock of Galahs, when I noticed a strange "Galah" in company with the others. This new bird had a pure white back and wings, with a deep salmony-pink shading on the under-wings. When the bird came to rest, I saw to my delight that he was a Pink Cockatoo. In Victoria, this species is only found in the mallee areas of the north-west. Such an occurence so far south is extremely rare, although possibly he was an aviary escapee.

Other birds that I have seen in the Rosanna area include White-necked Heron, Pink-eared Duck, Sharp-tailed Sandpiper, White Egret, Royal and Yellow-billed Spoonbills, Red-backed Parrot, Golden-headed Fantail Warbler, Little Grassbird, Reed Warbler, Black-fronted Dotterel, Little Falcon and Red-browed Finch.

Goose Barnacles

Mrs. Ellen Lyndon has sent some notes on her own observations, together with those of a 16th-century observer. A similarity exists between the two, although obviously not between the spelling used.

At the mouth of the Aire River, near Cape Otway, where we were staying at Christmas, the tide one morning brought in a huge baulk of squared timber and left it stranded on the beach. The entire surface of this wood was covered by long-stalked goose barnacles doomed to die in the sun, for it was much too heavy for us to return it to the sea. The best we could manage was to surround it with a moat and let the outgoing salty water from the river flow around it. At once all the creatures on the timber strained to reach the water and in those that could touch it the shells opened and the feathery appendages began to scoop the water inwards. A barnacle has been described as an animal that stands on its head and kicks food into its mouth with its feet!

Barnacles, the bane of ship-owners, are protected by a series of shelly plates which would suggest to the casual observer that they are shellfish of some kind. However, they are not molluscs at all but degenerate crustaceans which have adopted a sedentary life. The young are microscopic and free swimming but as they grow they find some solid object in the sea and cement themselves permanently in place and alter their form, developing the shelly plates and usually a long stalk. The feeding and breathing limbs projecting from the shell resemble the tail feathers of a bird and many strange myths about geese arising from the shells have come down to us through the centuries. Therefore it was with considerable curiosity and interest that we sat watching these odd objects feeding.

Gerard the herbalist, writing in 1597 and doubtless passing on the stories of writers generations before his time, had this to say about the mysterious goose barnacles.

"There are found, in the north parts of Scotland and islands adjoining it, certaine trees whereon do grow certaine shells of a white color tending to russet, wherein are contained living creatures; which shells at maturity doe open and out of them do grow these little living things; which falling into the water do

become fowles, which we call barnacles; in the north of England, Brant Geese; in Lancashire, Tree Geese; but others that fall upon the land perish and come to nothing. This much by the writings of others and also from the mouthes of people in these parts, which may very well accord with truth."

Gerard goes on to describe pieces of old wooden ships and rotten logs cast up by the sea.

". . . . whereon is found a certaine spume or froth that in time breedeth into certaine shells in shape like those of a muskle but sharper pointed and of whitish colour; wherein is contained a thing in forme like a lace of silke woven as it were together, one end whereof is fastened unto the inside of the shell, even as the fish of oisters and muskles are. The other end is made fast unto the belly of a rude masse or lumpe, which in time cometh to the shape and forme of a bird: when it is perfectly formed the shell gapeth open, and the first thing that appeareth is the foresaid lace or string; next come the legs of the bird hanging out and as it groweth greater it openeth the shell by degrees, till all is come forth and hangeth only by the bill. In short space after it cometh to full maturitie and falleth into the sea where it groweth feathers, and groweth to a fowle bigger than a Mallard, but lesser than a Goose, having black legs and bill and feathers black and white, which people in Lancashire call by no other name than Tree Goose: which place aforesaid, and all those parts adjoyning do so much abound therewith that one of the best is bought for threepence."

The common name of *Branta leucopsis*, the Barnacle Goose, a winter visitor to northern Britain, is still in use today, and on comparing the pictures of the goose and the barnacle it does not require much imagination to see how the myth of the Barnacle Goose arose. In fact I could almost be persuaded to believe in it myself!

The Spread of the House Sparrow

These significant notes were received from John B. Cleland of Adelaide.

Dick Hudson's "Some Notes on Sparrow" in the June issue for 1966 are of much interest. During the making of the East-West railway line, Captain S. A. White undertook the task of guarding Western Australia from being invaded by the House Sparrow. These sparrows require the surroundings of homesteads and cultivated land for their sustenance. They can accompany camps of navvies as they progress but I gather cannot exist in our bush. As the East-West railway line was built from both ends, meeting somewhere in the centre, sparrows did not reach Kalgoorlie. Railway camps evidently brought them to other South Australian country towns.

Fauna Slaughter

Whilst browsing through the pages of *The Australasian Sketcher*, a newspaper produced in the latter half of the 19th century, I came across these figures associated with the slaughter of native fauna—

In Queensland between 1877 and 1902, totals of nearly 7½ million kangaroos and wallaroos; 9¼ million wallabies; and half a million pademelons, bandicoots, and kangaroo rats were destroyed.

close to nature

How many of us realize just how close we are to nature; and with what little effort it can be studied?

From the fluttering moth at a lighted window, to the spiders in the darkest corner of our garden shed; the wonders of the natural world are numerous—to the careful and patient observer!

This is a series in which a look is taken at some of these creatures which make up this "world in the garden". The aim is not to provide a completely scientific treatise on each subject; but rather to provide enough general detail to stimulate an interest in the things around us.

If the series encourages us not only to look; but to see something in what we are looking at, then it will have served its purpose.

In ancient Egypt, the Scarab Beetle was regarded as a sacred creature, whose life cycle was a symbol illustrating the Egyptians' religious beliefs of death and re-birth. The beetle was also apparently well-known in Biblical times, for in Leviticus (ch. 11 Auth. Vers.), we read of the "clean and unclean" animals, of which the beetle was regarded as "clean".

However, although beetles form close to 50% of the total number of insects of the world, and may be found in a host of situations ranging from water to desert, for some reason they cross our path less frequently than some of the less numerous members of the insect world. Of course, we are all familiar with a few of the order Coleoptera, such as the Christmas Beetle, the small brown Blossom Beetles of summer evenings, and the Ladybird. At this point, the average person tends to hesitate, and with a little more thought, mentions perhaps one or two more; such as the Whirligig Beetle of the ponds, or the Longicorn Beetle.

The Rhinoceros Beetle, showing its general appearance. (approx. natural size)
Photo: G. Ward

It is not strange therefore, that my curiosity was aroused when I came across the subject of this article.

Looking like a "Lilliputian" rhinoceros, it lumbered uncertainly over the freshly dug garden bed towards me.

In order that I might not lose him while getting my camera from inside, I turned him over on his back and placed him on the relatively smooth surface of a concrete slab. I felt pretty certain that he would still be there when I returned, for to me, there is nothing more pitiful and helpless than when one of these beetles lies on its back, waving its legs in a vain and ineffectual attempt to regain its proper position.

He was still like this when I returned to take some photographs.

As was mentioned earlier, the beetles form a large part of the animal kingdom with about 250,000 species, of which about 7% are classed as native to Australia. From this group, the Scarabaeidae family number about 2000 species; and the Rhinoceros

Beetle is a member of a sub-family of of this group, the Dynastinae.

The Rhinoceros Beetle, in common with most beetles, has two pair of wings, with the fore-wings forming the hard wing-cases or *elytra*; whilst the functional flight wings lie folded beneath these. The mouthparts consist of mandibles for biting and chewing. Upon the prothorax and head of a number of the Dynastids, are exhibited prominences of varying size, which lead to the use of the very appropriate common name.

The forelegs are modified for burrowing, and the larva are of the typical "curl-grub" type which feed on the roots of grasses.

This particular species (probably *Dasygnathus trituberculatus,* Blackburn) which I came across, was of a shiny, dark treacle-brown colour above, with golden-brown growths of hair on the underside, and around the mouth parts. He also proved to be a beetle very much in demand, for both my children wanted to take him to school to exhibit in their respective classes.

It may prove profitable to take more notice of the various beetles which frequent the garden, for there must be many others of this large order, of just as much interest as was this "miniature rhinoceros".

Above—Profile of beetle showing prominences on head and pro-thorax.

Left—Front view of beetle. (Note modified forelegs, common among the burrowing beetles.)

Photos: G. Ward

Book Reviews

Marsupials and Monotremes of Australia

By GORDON LYNE

(Published by Angus and Robertson)

Stiff cloth-cover with dust jacket, approx. 9½" x 11½". 72 pages with 57 b. and w. illus., 3 half-tone plates, and 5 radiographs. Price $3.50.

From the moment one looks at the attractive dust jacket of this publication, one is compelled to look further into the book; and in so doing, is intrigued by the wonderfully executed and accurate black and white pen drawings from the hand of the author. Not only are they illustrations of the more characteristic positions of the animals; but some also capture the more uncommon poses such as a young bandicoot entering the mother's pouch, or the portrait of a 4 months old Brush-tailed Possum.

Attention is given to details of gestation period and the development of young, together with the fertility period of the adults where known— subjects not often covered in similar books.

Of course, in a book of this size, it is impossible to account for every marsupial of Australia; therefore, rather than cover the same ground as other publications of a similar type, Dr. Lyne has dealt with some of the lesser known members of the group.

Included among these are the Brown Marsupial Mouse, Byrne's Marsupial Mouse, the White-footed Marsupial Mouse of Tasmania, two species of Hare-Wallaby and Rock-Wallaby, the Lumholtz's Tree Kangaroo.

The book itself is attractively set out; and the use of high quality art paper throughout, helps to capture the quality of the original illustrations. The text is particularly well written, and should satisfy both layman and specialist.

For the person searching among the Australian natural history publications, either for himself or for a friend, here is a book that should not be passed by; particularly when one considers its reasonable cost.

G. M. W.

A Handlist of the Birds of Victoria

By W. ROY WHEELER

(Published by Victorian Ornithological Research Group)

Lightweight cardboard cover, approx. 6" x 9½". 88 pages with b. and w. Distribution Maps covering each bird. Price 75c.

With the publication of this work, each species of bird known to have occurred within the state of Victoria, has been placed on record.

It is presently, the most up to date handlist of birds for any of the Australian states; with Western Australia and South Australia having each published one in 1962, and New South Wales and Tasmania having done the same in 1960 and 1958 respectively.

As well as being up to date, another distinct advantage of the work is the application of distribution maps to each species of bird. These, together with concise but accurate and lucid notes, make for easier fieldwork.

Two maps in the beginning of the book, cover the subdivision of Victoria into separate districts; one showing the individual districts and the other indicating the major towns and cities within each. Explanatory notes on the type of country within these areas is also given.

Another virtue of the Handlist is in its adherence to the 1926 Official Checklist of Australian Birds for classification and naming of species. This is of benefit to the specializing Ornithologist.

The author, well known and greatly respected throughout Australia, both as a person and an authority on birds, has spared no effort in producing this work. Although numerous people have been involved, the bulk of the work in collating the material and moulding it into an efficient handlist, has been done by Mr. Wheeler.

From the viewpoint of both the specialist and the layman, this is a most valuable addition to the natural history section of the library; and it may not be unwise to hold two copies—one for the field and one for the book shelf.

G. M. W.

Country Club Notes

Benalla Field Naturalists Club

5th Annual Report

No words can express the sense of loss we felt, with the death in an accident last August, of our loved President, Mr. W. McCall Say.

Mr. Say was inaugural president at our formation in 1961, and held the office of president until his death.

Let us carry on with the work he began.

We face a great challenge as a people—that we develop our country and at the same time maintain and protect the natural fauna and flora which are indigenous to it.

We can make Australia into a paradise where no plant, bird or animal need be lost to future generations. We must not waste time in doing this.

We face a challenge as a club, in losing our president, who had been our guide and friend since the formation of the club. Each member, whether office bearer or floor member, must endeavour to consolidate our position. We believe in our club's endeavours, let us work for tangible results.

This year, because of the alteration of the times of annual meetings, this report covers only the period since April 1966.

Membership: Average attendance at meetings since April has been twenty-three. The club has a lot to offer to new members, and could achieve much more with a greater membership. Our junior members are a valuable asset and we must endeavour to provide interest for them.

Excursions: Successful excursions were held to the Winton Swamp and to the Warby Plant Sanctuary, where members met well-known bird authority Mr. Roy Wheeler, who afterwards conducted a screening of colour slides in the Glenrowan Hall.

Guest Speakers: These were again outstanding, and memorable addresses were given by—Mr. S. Cowling, Fisheries & Wildlife; Mr. J. Cummings, Caving; A Monash Scientist, Flying Foxes; Mr. K. Terry, Ecology and Environment with reference to the Alpine areas of North East Victoria; German Scientist, Father Brown, Phalangers and Germany; Miss Nason, Warby Preservation Society.

Car Stickers: We now have the distinctive F.N.C. car stickers featuring the grass tree.

Butterfly Tagging: Mr. R. Edgar is working with the Australian Museum and the students at the Benalla Technical School, on a scheme to trace the movements of the Wanderer Butterfly.

Warby Ranges: Mr. G. D. Brooke represented the club on an important delegation to consider the future of areas in the Warby Ranges.

Reefs: The club has voiced its concern over burning of the Reef Hills as a fire protecting measure.

Pine Plantation: Great concern is felt by many at the replacement of natural

forests by pine plantations. As pine plantations are biological deserts, and may have very bad long term effects on water catchments, the club opposes the large scale plantings said to be planned in the Warrenbayne area. Our visiting overseas scientists left us in no doubt of the folly of planting large areas exclusively to pine forests.

We are never short of interesting observations at our meetings, and to conclude, I shall not easily forget the words of our late President: "To be interested is to live". Therefore, let us show our interest in our country, and live for its advancement.

Horsham Field Naturalists Club

8th Annual Report—August 1966

The Horsham Field Naturalists Club has completed another successful year. Membership stands at forty-seven, including two junior members, and meetings are well attended.

The Club meets on the 4th Thursday of each month in the Horsham Technical School. A feature of meetings is the display of specimens by members. An outline of subject matter for meetings was as follows:—

Two members nights and two film nights consisting of the screening of Nature films from the State Film Centre.

A Question Night was introduced, and proved so successful that a second was held at the request of members. Members, questions on items of Natural history interest, are pooled. They are then distributed to the Club members, who investigate their allotted questions and present the answers at

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the Question Night; resulting in discussion on a wide variety of subject matter.

Visiting speakers: Mr. M. Streeter of Portland Field Naturalist Club gave a slide-illustrated address on Birds and Bird Photography in the Portland area. Mr. Barry May of Longerenong Agricultural College spoke on "Agricultural Entomology".

Mr. Fred Davies of Portland, with "Walkabout in Ancient Australia", gave an account of a field naturalist's tour of Central and Western Australia, supported by slides and tape recorded natural sound.

Mr. Keith Ashby of Blackwood, South Australia, showed colour slides depicting Autumn Colour in North America, supported by a fine display of Humming-bird skins of varied size, shape, and iridescent colour.

At a special Christmas social gathering, Mr. Eric Barber of Portland was guest speaker and showed slides of his recent tour of Arizona.

Club outings were held to Deep Lead, to look at mining relics and search for small sea fossils found in the area; Roses Gap in the Grampians, in conjunction with the Historical Society; and Burke's Bridge on the Glenelg River, where some members found interesting specimens of fossil fern.

The Darragan Sanctuary project is still awaiting the official survey by the Lands Department.

Thanks to all members for loyal support, especially to the Executive Committee, and in particular, the Secretary, Mrs. T.L. McKenzie.

C. C. Kroken,
President.

Field Naturalists Club of Victoria

General Meeting—10 April 1967.

There was a large attendance at the meeting, and the President, Mr. W. Lloyd Williams, was in the chair. He announced the sad news of the death of two members, Mr. D. J. Dickison and Mr. E. H. Coghill. Mr. Hugh Stewart said that Mr. Dickison had been a member of F.N.C.V. since 1917, and although he had not taken a very active part in it, he had publicised its activities. He was interested in bird societies, the R.A.O.U., the Leach Memorial Club in former days, and the Bird Observers' Club. He was secretary of the R.A.O.U. and at its jubilee in 1951, he wrote the history of the R.A.O.U., which was published in "The Emu".

Mr. Stewart said that Mr. E. H. Coghill had done tremendous work for the club and belonged to a family, which was associated with the F.N.C.V. from its earliest days. His father, Mr. George Coghill, had a very long connection with the club.

The present secretary, Mr. D. Lee, said he has had the opportunity to know something of what Mr. Coghill did during his eleven years as secretary, through the thousands of letters he wrote, and the attention to details that hold the club together. Mr. Lee gave as an illustration the amount of trouble Mr. Coghill went to, and letters he wrote and personal visits he made to the museum and other places, in reply to a request from a boy of eleven years who wrote for advice about keeping an ant farm.

The president emphasized the interest and skill and every type of work Mr. Coghill put into this club so that other people could benefit.

The members stood for a minute in silence in respect for the memory of Mr. Coghill and Mr. Dickison.

The president announced that he had received a letter from Miss Janet Raff, telling of a Symposium on Insect Abundance being held by the Royal Entomological Society of London, 41 Queensgate, in September 1967. If any member should be going to England, they may obtain an application form to contribute.

He also announced that the Native Fauna Conservation Society were having an evening at the Herbarium on 10 May, when Mr. David Giles is to give an illustrated talk on "Bogs, Swamps and Marshes". He also directed the attention of members to the "Case for Conservation" being presented by ABV-Channel 2 on Fridays. He pointed out that on the previous Friday, conservation of vegetation all over Australia was considered with the problems of development and conservation. It was stressed that Tourist Resorts and National Parks are not the same thing. He has written to the manager of Channel 2, congratulating him on the session.

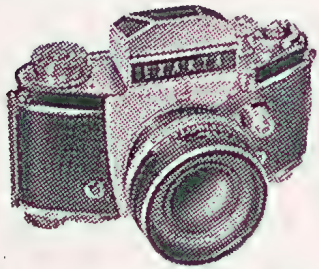
The Secretary reported that the Lapidary Club of Victoria is having a show in the Manchester Unity Hall in Malvern, on 14th, 15th and 16th of July. F.N.C.V. members are invited to install an exhibit.

The President said he had received a letter from Mr. Noel Lothian from the Adelaide Botanic Gardens, congratulating the club on the one thousandth issue of the "Naturalist".

Another letter of congratulation from the South Australian Naturalist Club was received, and it predicted that the F.N.C.V. "Naturalist" will still be going for its two thousandth issue if it continues on the way it is going.

The subject for the evening was "Polychaete Worms" by Mr. R. L. Jensz. He pointed out the scarcity of literature and the difficulty of communicating with other workers in this field. This discourages amateurs who can be very helpful to scientific investigations.

Very little has been done on Australian polychaetes comparatively. There are 53,000 species in 720 genera altogether, but in Australia only 350 species in 165 genera are known; although the Australian Coast is so vast with such differences of warm north and cool south currents, which should provide a rich field. He outlined the main divisions of the phylum Annelida, pointing briefly to the chief characteristics distinguishing Archiannelida, Oligochaeta, Polychaeta and Hirudinea, all being segmented ani-



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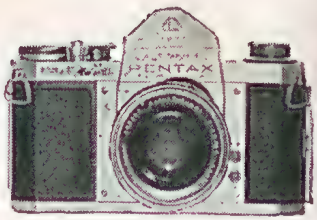

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mals. Mr. Jensz sketched very clear chalk-board diagrams, illustrating the complex features of a head of a polychaete including the prostomium with or without eyes, variable antennae, palps, tentacles and sometimes coming from under the head, a proboscis with horny jaws. Behind the head may be a plain part of one or two or more segments, or they may have projecting *cirri*. Most of the remainder of the many segments possess unjointed flaps on each side—the *parapodia*; each of which may be divided into two, an upper *notopodium* and lower *neuropodium*, each often having small projections called *cirri*.

Also there may be branchiae or gills on the dorsal surface. Bristles or *setae* (chaetae) are typically on the lobes of the *parapodia*. These *setae* vary in different parts of the same body and in different worms, and are diagnostic. They may be a circular, hooked, limbate, fan or cone shaped or uncinate.

Many slides of line drawings illustrated these features, showing great diversity in different species. Mr. Jensz described some of the strange variations that may be found such as the hair like covering of Aphrodite (Sea Mouse), scale-like plates on Polynoe, the beautiful opalescent Eunice that can give a painful nip, the splendid plume of Sabella, long trailing tentacles of Terebella, the splintery glassy bristles of "fire worms" and the tremendous toothed proboscis of Goniada. Most show separate sexes, and some bud asexually in chains; some even branching, and being so prolific on the surface of the sea at full moon, that they provide food for the natives of the locality.

Many live partly in tubes, Galeolaria having a calcareous stopper to shut the tube when it retires at low tide.

There is a great diversity in diet too, some being filter feeders, and some carnivorous.

The President thanked Mr. Jensz for the most interesting address and members showed their appreciation in enthusiastic applause.

Under General Business, it was reported that the Wimmera Club has been contacted to determine whether they could present the Natural History Medallion to Mr. Garnet at the July meeting. A telegram has been sent to the Premier registering the club's objection to the reported approval of the Government to the construction of a lake at Tatra Inn at Mt. Buffalo.

Mr. R. Taylor, with Mr. J. H. Quirk, went up to Mt. Buffalo to inspect Tatra Inn and found it deserted. They reported that respect for the surroundings there is minimal, and it is surrounded with litter. Excavations there leave room for erosion. Mr. and Mrs. Frankenberg were scientifically examining the area of the proposed lake. It would be a major disturbance for the commercial benefit of the lessees. The President said that he had telephoned the National Parks Authority and he believes they are not in favour of power boats on the proposed lake.

The loss of the 30 or 40 acres which may be given up for the lake would interfere with the natural environment with far reaching effect. Mr. W. C. Woollard remembered that grazing properties were once leased there for £80 a year, and recently a great amount had to be spent to correct the erosion caused. He reaffirmed the danger of disturbing the flora and fauna.

Mr. Quirk said it would be impossible to police the prohibition of power boats. Mr. R. Taylor moved that the meeting fully endorse the action of the President, in protesting to the Premier against the proposal to construct an artificial lake for Tatra Inn, and they urge that a letter of protest be sent, conveying the wish of the members to the Premier and the National Parks Authority, requesting them to state their attitude. This was seconded and carried unanimously.

Mr. Woollard suggested that this club should try to organize all Natural History lovers and societies interested in Nature to hold a meeting of protest in the Lower Melbourne Town Hall. Mrs. Z. Lee supported this idea. The matter was referred to the Council for consideration.

Mr. J. Ros Garnet reminded members of the Wilson's Promontory protest. He doubted if the lake would be put in. He believed that individuals on the authority were against it.

Mr. Max Longford read old reports of April 1889, telling of the beginning of the construction of a dam on Mt. Buffalo. In June 1899 it was completed. In July 1899 it burst, so it was only in use five weeks.

The Secretary said that Mr. Hugh Stewart's book on the Buffalo National Park is on sale at the chalet.

Seven new members, whose names appear in the May *Naturalist*, were elected.

For the exhibit table, Mrs. G. Taylor

brought an emerald moth and a spider's nest of leaves from Mt. Franklin.

Mrs. M. North showed land snails' shells from Florida, New Ireland and New Guinea; a subfossil flax snail from New Zealand and *Paryphanta liquaria lusea, P. gillesi aurea, P. hochstetler,* all from New Zealand. Mr. R. Condron brought a Silvery Moth, *Terpna mniaria,* which has a looper caterpillar.

Botany Group Meeting, 11th May

With 22 members present, and Mr. Fuhrer in the Chair, Mr. Ray Smith gave a very interesting talk on "Weeds". He started by giving us several definitions of weeds; the shortest of which was "a plant out of place". The exact origin of the word itself is not clear, but is thought probably to be of Anglo-Sxon origin from the word "Woed". The Anglo-Saxon word for August being "Woed-monatte" meaning weed month. The equivalent word for weed in most European countries is quite different, in France it is "mauvaise herbe", meaning bad herb; and the German "Unkraut". Lawrence King in "Weeds of the World" lists ten characteristics that well define weeds:—

i. Growing in an undesired location.
ii. Competitive and aggressive habits.
iii. Of wild and rank growth.
iv. Persistence and resistance to control or eradication.
v. Consisting often of large populations with abundant, rank and extensive growths.
vi. Useless, unwanted, and undesirable.
vii. Harmful to man, animals and crops.
viii. Spontaneous growth, appearing without being sown or cultivated.
ix. Of high reproductive capacity.
x. Unsightly, with disfigurement of the landscape.

Mr. Smith then told us that a plant may be regarded as a weed, in perhaps wheat growing country, whereas in grazing land it would be considered good fodder. Many of the weeds found in Australia have come as seeds in imports from other countries, and weeds from such places as the Mediterranian countries, Northern Europe, South Africa and North and South America are among them. There is good reason to suppose, that many of these originated in the Balkan Peninsula, which being a country of ancient civilization, has had tmie to collect many plants, both good and bad. Commerce in grain was well established in the Balkans in ancient times, and as Mr. Smith stated, "the grain could scarcely have been **clean** by modern standards"; and so was a likely carrier of weed seeds. A few broad groups of weeds were spoken of, with examples of each. Annual, Perennial, Biennial, Woody plants, Aquatic weeds, Parasitic weeds and Vines, climbers and stranglers, were the divisions made.

In spite of their nuisance value "weeds" can make a very interesting topic, and at the close of the talk, Mr. Fuhrer called for a vote of thanks to Mr. Smith, which was carried by acclamation.

It was decided that Botany Group Excursions should be held on the second Sunday of each month for the rest of the year.

For our next meeting, Thursday 8th June, we are to have Miss Helen Aston to tell us "How the Plant Taxonomist works"; and in July, Mr. J. H. Willis will speak on "Flower perfumes".

Geology Group Report. 3rd May.

32 members and visitors were present. The Chair was occupied by Mr. Davidson in the absence of Mr. Dodds. Mr. Box reported that the week-end excursion in April to the Geelong-Barwon Heads-Torquay area was a great success. Members were fortunate to have as leader Mr. Rowe, teacher of Geology at the Gordon Institute at Geelong. Places visited were the Batesford Limestone Quarry, the Epi iorite quarry at Ceres, the Scoria quarry at Mt. Duneed, the Jan-Jukian beds at Torquay, and to Jarosite where a mineral of that name was burnt for ochre. The subject for the evening was a series of short talks by members on the Geology of the Melbourne district. Messrs. McInnis and Sault spoke on the Palaeozoic Era, and the deposition of sediments in the Gulf caused by the Tasman Geosyncline; and Mr. Whatmough described the Tertiary Period, particular the Beaumaris area. He described the unusual pattern of the beds there, the deformation caused by the Beaumaris Monocline, and also the Melbourne Flexure which has its western boundary there.

Exhibits

Mr. Whatmough—Fossil shark's teeth (Miocene); whale bone (Miocene), Beaumaris.

Mrs. Skopakow—Stauralite, Mary Kathaleen; ribbonstone, Mt. Isa; Dendritic Jaspar, Duchess, Qld.; Native Copper, Mt. Isa; Wollostonite, Rockhampton; Tourmaline, Mica Creek, Qld.

Mr. Davidson—Specimens of Turquoise (some polished), Greta South; rocks from Cambrian Diabase, Dookie Quarry; Calcite, Dookie.

Mr. Angior—Palagonite, Batesford; Jarosite, Angelsea; fossil Echinoid, Torquay; Gypsum, Torquay; Epi-diorite, Ceres.

Mr. McCay—Concretions with iron and barytes, S.A. Devils Dice, S.A.; lava (Pre-Cambrian), S.A.; Dendrites, Jaspars, shell casts, S.A.; common Opal, Dendrites, Petrified Wood, Gelintipy.

Mr. Spencer—Geodes from Porphoritic Rhyolite, Tabberabbera; Jaspar from Conglomerate, Tabberabbera.

Mr. Francis—Fossil Echinoid, Oysters, Nowa Nowa.

Marine Biology and Entomology Reports for March and April, 1967.

March 1967.

Mr. Condron chaired the meeting which was attended by 24 members.

Mr. McInnes reported on the San Remo outing, and said that it was a great success in every way. He also spoke on the polychaete worms; specimens of which he obtained at San Remo and had not seen before. Mr. McInnes also announced that the next club outing would be on March 18th, to the Bellarine Peninsula, when there will be a good low tide at a suitable time.

Mr. Coghill had received a letter from the Stawell Field Naturalists' Club asking for assistance with specimens for their forthcoming Nature show.

Guest speaker for the evening was Mr. A. Neboiss, curator of insects, National Museum. Mr. Neboiss showed his prize winning film on the Stone Fly, with suitable captions. This beautiful film was much enjoyed by members. He also showed a film on the excavations which took place at Keilor in connection with the ancient skeletons which were discovered there. His film was also much enjoyed. At the conclusion many questions were asked by members, and a vote of thanks was given by Mr. P. Kelly.

Exhibits

Mr. Condron showed some Lepidoptera and other insects collected by him during the holidays.

Miss Baalam showed a piece of orange sponge, species unknown.

Mr. McInnes showed some species of polychaete worms taken on the San Remo outing, one, *Eunice aphroditois,* Mr. McInnes explained, was different in anatomy to *Nereis,* the head being a different shape, and the colour beautifully iridescent when alive.

Mr. Strong showed a large black fly which he had taken at Mallacoota, Mr. Neboiss identified it as *Erephopsis guttata* Fam. Tabanidae; a species of March fly.

April 1967.

Mr. Condron chaired the meeting which was attended by 25 members.

The Secretary announced that he had contacted Dr. Ian Hiscock, Senior Lecturer in Zoology at Monash University, who agreed to give the group a general talk on Jelly Fish, later in the year.

Mr. McInnes announced that the Nature Show Committee would hold its first meeting on 21st April, and asked the group to think about a subject for display at the show.

Mr. Trotter suggested a stand, placed in a prominent position, for enrolment of new members.

Mr. Harrison moved, and Miss White seconded a motion that this suggestion be recommended to the Show Committee. Further discussion was to take place at the May meeting.

Mr. Condron then introduced the speaker for the evening, Mr. F. Collett. Mr. Collett showed some beautiful slides of different species of insects, and although he is not an entomologist, gave the group a very interesting short commentary on each slide.

Many questions were asked by members, and at the conclusion a vote of thanks was moved by Mr. Harrison.

Exhibits

Mr. Trotter showed under his microscope a beautiful slide of butterfly and moth scales arranged in a pattern. He explained that there was quite a difference in the structure of butterfly and moth scales when seen under high microscopic power. Mr. Trotter also showed a slide of American diatoms.

Mr. Harrison showed a collection of fossil shells from Fossil Beach, Mornington. These ranged from small to large. Mr. Harrison gave a short talk on fossil shells, with special reference to their interesting sculpture.

Mr. Lublin showed a corticeps which had been killed by fungus.

Mr. Strong showed under low microscopic power the compound eyes of a species of March fly.

Microscopical Group Report
March 15th, 1967.

This was a well attended meeting with 23 members and visitors present, and Mr. J. Daws presided.

The minutes were read and confirmed.

At the commencement of the meeting everybody expressed disappointment at the cancellation of Mr. Dade's visit, through illness, and expressed the hope that they would be able to meet him at a later time.

It was decided to have an excursion to a suitable place for the collection of pond life on Sunday, April 16th, and a subsequent display of "the catch" under microscopes on the following Wednesday.

At the suggestion of Mr. W. Genery it was decided to make the outing to the Tanti Creek area, at Mornington.

Mr. K. Trotter gave a report on his examination of the club diatom microslides. He explained that the cabinet originally contained 1116 slides, of which 142 are missing, 807 are quite good, and most of the remainder are questionable. A number of these are useless and should be destroyed. He moved a motion, which was seconded by Mr. D. McInnes, that these slides should be destroyed.

At this point the Secretary moved an amendment, requesting that the slides be, not destroyed, but merely set aside. Although he had not made a personal examination of the slides in question, he expressed the opinion that nothing representative of past-microscopy should ever be destroyed: every slide which may appear useless today may be repairable tomorrow if some one is interested enough. Slides without the appearance of a specimen could, if the label is legible and accurate, be permanent proof of the existence of some form of life at a particular date and area.

At this point a vote was taken on the amendment which was carried; thus it was decided to set aside the slide in question.

Following this the secretary announced that because of personal reasons he wished to vacate his post. He was asked to carry on until the April meeting.

The rest of the evening consisted of the display and discussion of numerous specimens displayed under the 17 microscopes in use.

Mr. McInnes displayed some interesting rock sections.

Mr. E. LeMaistre exhibited a fine gem opal. He explained the latest theory of colour variation in opal.

Mr. W. Genery exhibited some volvox and a very lively specimen of the colonial rotifera, *Conochilus unicornis*; rotifera in which the individuals radiate from the centre of a living, spinning ball.

Mr. K. Trotter exhibited an excellent slide of arranged diatoms, sponge spicules and silico-flagellates; this slide he kindly donated to the slide library to replace that which was accidentally destroyed when an attempt was made to repair it. (No. 96, which was a slide of arranged diatoms and butterfly scales.) He also displayed a slide of some forams which were illuminated in a rather unique way, reflection of light from a circle of silver deposited on the under surface of the cover. His two young friends also displayed slides of forams and diatoms which they themselves had made.

Mr. P. Genery's exhibit was to have been a living tardigrada (water bear) which he had taken from the Yarra recently. Unfortunately it was lost, and he substituted a slide of one of these curious creatures.

Mr. Karl Meyer—stained section of hibiscus.

Mr. C. Nance—stained stem section.

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F.N.C.V. DIARY OF COMING EVENTS

GENERAL MEETINGS

Monday, 12 June—At National Herbarium, The Domain, South Yarra; commencing at 8 p.m.

1. Minutes, Reports, Announcements.
2. Correspondence.
3. Subject for the evening: Wangaratta Trip—Miss Joan Forster.
4. Election of New Members.
   (a) *Ordinary:*
   Eva H. Holmes, 14 Lexton Gve., Armadale S.1.
   Joint:
   Mr. and Mrs. N. B. Cleeves, "Greenbriar Nursery", Britnells Rd., Briar Hill, Victoria.
   Mr. and Mrs. Graham Webb, 47 Fortuna Ave., North Balwyn. (Interest—Microscopy)
   (b) *Junior:*
   Gordon Temby, Box 327, Hamilton, Victoria.
   (c) *Subscriber:*
   The Field Naturalists Club of King Island, Long Ridge, Currie, King Island.
5. General Business.
6. Nature Notes and Exhibits.

Monday, 10 July—Medallion Lecture on Conservation—Mr. J. Ros Garnet.

GROUP MEETINGS

(8 p.m. at National Herbarium, unless otherwise stated)

Thursday, 8 June—Botany Group.

Wednesday, 21 June—Microscopical Group. "Preparation of Pathological Specimens". Mr. L. Winsor.

Friday, 30 June—Hawthorn Junior F.N.C. meeting in Hawthorn Town Hall at 8 p.m. Subject—"Mounting Specimens in Plastic". Mr. Ian Morrison.

Monday, 3 July—Marine Biology and Entomology Group. This group meets in Mr. Strong's rooms at Parliament House at 8.00 p.m. Enter through private gate at south end of building.

Wednesday, 5 July—Geology Group.

Thursday, 6 July—Mammal Survey Group. This group meets in the library of the Fisheries and Wildlife Dept., Flinders Street Extn., at 7.45 p.m.

Friday, 7 July—Preston Junior F.N.C. meeting in the Rechabite Hall, 251 High Street, Preston (north from Bell Street), at 8.00 p.m.

Thursday, 13 July—Botany Group.

F.N.C.V. EXCURSIONS

Sunday, 18 June—A combined excursion with the Geelong F.N.C. to the Batesford Sanctuary. The bus will leave Batman Avenue at approximately 9.20 a.m. Fare $1.80. Bookings with excursion secretary. Bring one meal. Afternoon tea will be available at a nominal charge, proceeds in aid of the Red Cross.

Thursday, 31 August, to Sunday, 10 September—Broken Hill. The party will leave Melbourne on August 31st, stay overnight at Mildura, and reach Broken Hill on Friday September 1st, remaining there for a week with day trips in conjunction with the Barrier F.N.C. An extra day will be taken for the return journey stopping overnight at Mildura and Swan Hill. The cost will depend upon the number going but should not exceed $100 inclusive (lunches excepted). Bookings should be made with the excursion secretary accompanied by $10 deposit, with the balance to be paid by the end of July.
Any cheques should be made out to—Excursion Trust, and not to the F.N.C.V.

Field Naturalists Club of Victoria

Established 1880

OBJECTS: To stimulate interest in natural history and to preserve and protect Australian fauna and flora.

Patron: His Excellency Major-General Sir Rohan Delacombe, K.B.E., C.B., D.S.O.

Key Office-Bearers, 1967

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FNCV Accountant: Mr. R. L. Smith, 430 Little Collins Street, Melbourne, 3000. (67 3131).

Hon. Editor: Mr. G. M. Ward, 54 St. James Road, Heidelberg, 3084.

Hon. Librarian: Mr. P. Kelly, c/o National Herbarium, The Domain, South Yarra, 3141.

Hon. Excursion Secretary: Miss M. Allender, 19 Hawthorn Avenue, Caulfield, 3162.

Hon. Sales Officer: Mr. E. R. Allan, c/o National Herbarium, The Domain, South Yarra, 3141.

Group Secretaries:

Botany: Mrs. P. E. Matches, Flat 3, 33 Abercrombie Street, Balwyn (80 3651).

Geology: Mr. R. Box, 19 Fulham Grove, Reservoir (47 5393).

Microscopical: Mr. P. Genery, 42 Barnard Grove, Kew (86 5851).

Fauna Survey: Mrs. R. Frankenberg, 36 Percy Street, Balwyn.

Entomology and Marine Biology: Mr. J. W. H. Strong, Legislative Council, Parliament House, Melbourne, 3002.

MEMBERSHIP

Membership of the F.N.C.V. is open to any person interested in natural history. The *Victorian Naturalist* is distributed free to all members, the club's reference and lending library is available, and other activities are indicated in reports set out in the several preceding pages of this magazine.

Rates for January-December 1967 are:

Ordinary Membership	$5.00
Country Membership (over 20 miles from G.P.O., Melbourne)	$4.00
Junior Membership (under 18 years)	$2.50
Subscription to the *Victorian Naturalist* (non-members)	$4.00

All subscriptions should be made payable to the Field Naturalists Club of Victoria and posted to Mr. R. L. Smith, 430 Little Collins Street, Melbourne, 3000.

Note: The currency of the present club year and Volume 84 of the *Victorian Naturalist* is from January to December, 1967.

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F.N.C.V.

the VICTORIAN NATURALIST

Vol. 84, No. 7 JULY, 1967

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Front Cover

It is quite some time since a geological illustration appeared on the front cover of the *Victorian Naturalist*. In fact, not since May 1964, when the Sydenham Organ Pipes were featured, has the cover been devoted to this field of science.

It is proposed therefore, during the coming months, to publish a few photographs dealing with this subject.

The illustrations chosen form part of an important discovery, and have been made possible through the kind co-operation of Mr. Peter Duncan and Mr. Peter Handby.

Both of these names appeared in the daily press of January last, in connection with the significant geological finding of "part and counter-part" of a particularly well preserved fossil feather, from the Lower Cretaceous period of some 110-125 million years ago.

Also from these same beds, and through the work of these two men, has come the discovery of a number of extremely well preserved fossils of plants, fish, and insects.

We have chosen some of the insects for our purpose, mainly because of the fact that, according to expert opinion, this is

". . . undoubtedly the most outstanding horizon of Cretaceous insects in the world, and one of the few localities in which body structures, as distinct from wings, are preserved and that the detail of preservation is remarkable.

In some specimens, the claws no more than $^{1}/_{500}$ of an inch long at the ends of the legs, are clearly visible."

The particular beds from which these fossils were taken, occur in South Gippsland near Leongatha in Victoria. Mr. Duncan, over the past five or six years, has collected material representative of about one dozen of the thirty odd insect orders. Most of these have been of the aquatic nymphs, with only a few adult specimens.

The deposits are lacustrine in origin, and evidence suggests that the insects and fish died in a backwater shut off from the main body of the lake as the overall water level fell. Eventually, the water from here completely dried up; but although the lakes were of freshwater, it is thought that there was sufficient salt content to leave a slight bloom on the mud, which served to both preserve and protect the insect bodies from the initial inflow of the next seasonal rains, and until they were covered by a new deposition of silt.

Mr. Edgar Riek, Principal Research Scientist with the Division of Entomology, C.S.I.R.O. in Canberra, has been studying these fossils, and has at least two years work ahead of him.

He found, after detailed examination of some of the insects, that significant changes had taken place over the millions of years involved. One particularly interesting find was a flea, of a type which would live on a hairy animal, rather than on a feathered animal. This leads one to be alert for the remains of a possible host.

We shall await with interest, more information from this most important and valuable discovery; for it is not often that soft insect bodies are left in such a state of preservation as are these. It is only where insects have been preserved in amber, within parts of the Northern Hemisphere, that bodies have been at all suitable for study.

The fossil appearing on this cover, is of a Mayfly nymph, magnified five times.

The photographer was Mr. Peter Handby.

The

Victorian Naturalist

Editor: G. M. Ward

Vol 84, No. 7 6th July, 1967

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Obituary :—

The passing of Eustace Halley Coghill, on April 28, 1967, brought to a close a very long family association with the Field Naturalists Club of Victoria.

He was born at Canterbury on October 18, 1897, the son of George and Una Coghill. George Coghill joined the F.N.C.V. in 1882 and, during seventy-five years of membership, held various offices, including that of President in 1925-26. Una Coghill was the daughter of the Rev. J. J. Halley, a foundation member of the Club and President in 1882-3.

Eustace was educated at Trinity Grammar School. From there he joined the First A.I.F., serving with the 41st Battery, Field Artillery. He then studied Law at the Melbourne University where he completed a brilliant course in 1923, sharing the Supreme Court Prize.

He was called to the Bar in 1923, and appointments in later life included that of Supreme Court Librarian in 1934 and Master of the Supreme Court in 1957. He was a recognized

authority on legal history and on many abstruse legal principles. An obituary, published in the June 1967 issue of the *Australian Law Institute Journal,* provides details of his career and includes the comment that he has contributed more items to that journal than has any other person.

Eustace Coghill was introduced to the F.N.C.V. as a junior member in 1905. However, this early association eventually lapsed. In 1954 he rejoined the Club and shortly afterwards, in 1956, accepted the position of Honorary Secretary. He considered this an appropriate step, in view of his father's long association with the Club. The secretarial work was always accomplished with skill, thoroughness and diplomacy, reflecting his legal training and administrative experience. He was Secretary of the F.N.C.V. for eleven years, relinquishing the position in March 1967.

As a naturalist his main interest was in the field of entomology. This did not take the form of research and publication but was evidenced by his many comments on specimens during club excursions and at general meetings as well as active membership of the Entomology and Marine Biology Group.

Two other traits of Eustace Coghill's character deserve mention. There was his alert wit and keen sense of humour. These are well illustrated by a comment to the Editor of the *Victorian Naturalist,* following the publication of a certain footnote indicating that an aboriginal name "Berak" was often mis-spelled "Barak". He wrote, "I am glad to see that you cracked down on those low people who mis-spell Berak. We know how particular the Aborigines were about their spelling"!

The other trait was an indomitable will, which remained in evidence to the end. During his last few years he maintained public activities and was always insistent on self-help, despite progressive physical disability.

The Club extends sincere sympathy in their bereavement to Mrs. Coghill and members of the family.

N.A.W.—A.G.H.

Planigale Holds Record Family Number

By David Fleay

Into the news again comes that useful marsupial "Lilliput"—the Planigale—midget of so called Pouched Mice, and probably the most savage little hunter for its size in all Australia.

Most adult specimens weigh less than a quarter of an ounce apiece, yet they have insatiable appetites for insect food; and cling fiercely to winged locusts bigger than themselves, as the victims indulge in violent "space" flights in futile evasive action.

Interestingly enough these sibilant-voiced dwarfs appear to be summer, rather than winter breeders, and thanks originally to Mr. G. A. Main of "Mungungo", Monto, who sent a mother and babies along for identification in 1960, it has been possible to learn quite a bit about their home life. (See *Vict. Nat.* Vol. 82, Nov. 1965.)

In accordance with Nature's allowance for the fact that the smaller the marsupial, the greater its peril from natural hazards, there is provision for a bigger increase per annum among the little fellows.

Therefore in the Planigale, tiniest of them all, one would reasonably expect the record in litters—and more young per pouch—load than in larger marsupial mice. Disappointingly however, the greatest number seen at one time in a pouch area in the wild, or in captivity, totalled nine.

I thought it possible, as in the case of the Yellow-footed Pouched-mouse, that teat number, and therefore anchorage points, varied. For although the teat numbers here may be eight, ten and eleven, I have a photograph of a "Yellow Foot" from Broadford, Victoria, with twelve fixed babies.

At long last, however, Steve Williamson of the Gold Coast, Queensland, has produced the expected, but, up to this time, missing evidence. Recently, on turning over a log, he found the original "old woman who lived in a shoe". She was a mother Planigale in a nest, with no more, and no less than fifteen well-furred babies!

So to Steve goes the honour of finding an Australian marsupial, with the greatest single pouchload ever recorded.

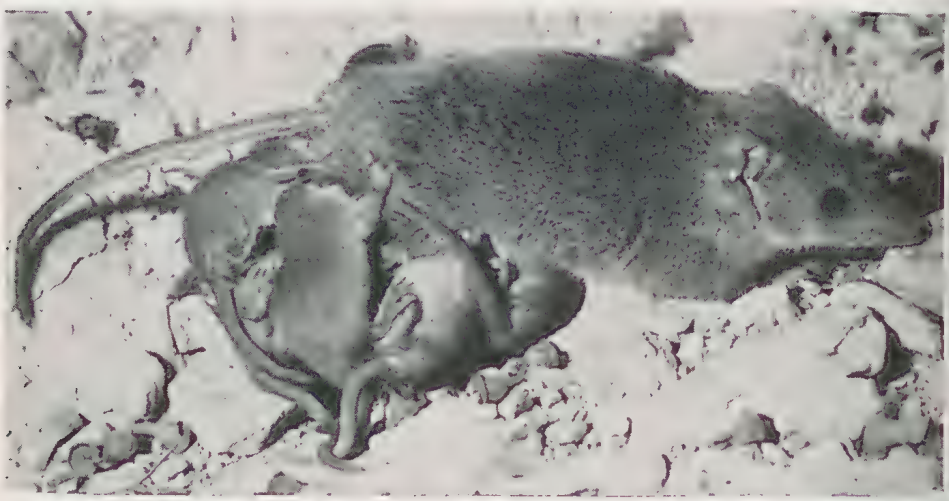

Photo: D. Fleay

Mother Planigale (*Planigale ingrami*) with young at teats.

Litter Size and Maternity Sites in Australian Bats (Chiroptera)

By John L. McKean* and Elery Hamilton-Smith†

Although single births are the rule in most bats, there are a number of exceptions to this, and as the litter size of mammals is of considerable importance in any consideration of population dynamics, it appears useful to summarize the literature and our records in this regard and to cite other data relating to Australian species.

In general, the bats are distinguished among the smaller mammals by their long life span, slow development to sexual maturity, long gestation period, small litter size, and by the fact that parturition only occurs once annually.

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Photo: L. S. Hall

Female *Nyctophilus geoffroyi* nursing two newly born young.

TABLE 1

Litter Size and Maternity Sites of Some Australian Bats

Species	Number of Young	Area	Maternity Site	Numbers of Litters Observed	Published References
Pteropus poliocephalus	1	E. Vic., E. N.S.W., and S.E. Qld.	Trees and Bushes	many	Ratcliffe (1931) Nelson (1965)
Pteropus scapulatus	1	N. N.S.W., and S. Centr. Qld.	ditto	ditto	Ratcliffe (1931) Nelson (1965)
Pteropus alecto	1	N. N.T., E. Qld., and N.E. N.S.W.	ditto	ditto	Ratcliffe (1931) Nelson (1965) Johnson (1964)
Pteropus conspicillatus	1	N.E. Qld.	ditto	ditto	Ratcliffe (1931)
Macroglossus lagochilus	1	N. N.T.	*	1	
Syconycteris australis	1	N.E. N.S.W. and E. Qld.		8	Nelson (1964)
Nyctimene robinsoni	1	N.E. Qld.		2	
Taphozous georgianus	1	N.W. Qld.	Disused Mine and Cave	3	
Taphozous nudicluniatus	1	N.E. Qld.		1	
Macroderma gigas	1	N.W. W.A., N. N.T., and N. Qld.	Caves and Disused Mine	many	Douglas (1962)
Rhinolophus megaphyllus	1	E. Vic., E. N.S.W., and E. Qld.	Caves and Disused Mines	many	Dwyer (1966) McKean & Hall (1964)
Hipposideros ater	1	N. N.T. and N.E. Qld.	Caves	22	Johnson (1964)
Hipposideros galeritus	1	N.E. Qld.	Disused Mine	5	
Hipposideros diadema	1	N.E. Qld.	ditto	6	
Tadarida australis	1	S. Centr. N.S.W.		1	
Tadarida norfolkensis	1	E. N.S.W.	Building	2	
Tadarida planiceps	1	S.W. N.S.W.	Tree Hollows	18	
Pipistrellus papuanus	1	N.E. Qld.		1	
Myotis adversus	1	S.W. Vic., E. N.S.W. and S.E. Qld.	Caves and Disused Tunnels	22	
Chalinolobus gouldii	2	S. Vic., S. N.S.W. and S. N.T.	Buildings and Tree Hollows	29	Johnson (1964)
Chalinolobus dwyeri	2	N. Centr. N.S.W.	Disused Mine	30	
Chalinolobus picatus	2	W. N.S.W.	ditto	1	
Eptesicus pumilus	1	Tas., S.E. N.S.W., A.C.T., N.E. Qld. and N. N.T.	Buildings and Tree Hollows	many	McKean & Hall (1964) Johnson (1964) Green (1965)
Eptesicus pumilus	2	N.E. N.S.W., and N.E. Qld.	Caves and Disused Mines	many	
Nycticeius rueppellii	1	N.E. N.S.W.	Tree Hollow	1	
Nycticeius balstoni	1	N.W. Vic., and S.W. N.S.W.		2	Ryan (1966)

TABLE 1 (*Continued*)

Species	Number of Young	Area	Maternity Site	Numbers of Litters Observed	Published References
Nycticeius balstoni	2	S.W. N.S.W.		1	
Nycticeius orion	1	E. N.S.W.	Building	2	
Miniopterus schreibersii	1	S.E. S.A., S. Vic., E. N.S.W., and E. Qld.	Caves	many	Dwyer (1963) McKean & Hall (1964)
Miniopterus australis	1	N.E. N.S.W., and E. Qld.	Caves	many	
Nyctophilus geoffroyi	2	S. N.S.W., Tas., Vic.	Buildings, under bark, and Tree Hollows	many	Ryan (1963) McKean & Hall (1964) Green (1966)
Nyctophilus geoffroyi	1	Tas., Vic.		2	Ryan (1963) Green (1966)
Nyctophilus timoriensis	2	S. Centr. N.S.W., & E. Centr. Qld.	Tree Hollows	5	

* Some bats were collected free flying, then dissected and the number of foetuses noted; some were kept alive in captivity where they gave birth.

Data on litter size in bats have been summarized by Ryberg (1947) and Herreid (1964). Most families are recorded as having only one young per litter. Twin births may occur rarely in the Pteropodidae and Phyllostomatidae. Anciaux de Faveaux (1960) also records a twin birth in *Tadarida condylura niveiventer* (Fam. Molossidae) although single births appear the rule in this and other members of the family. Some species in the families Rhinopomatidae, Megadermatidae, Rhinolophidae, and Vespertilionidae regularly produce twins. The genera *Lasiurus* and *Dasypterus* (Fam. Vespertilionidae) are exceptional in possessing four functional mammae and in regularly giving birth to litters of three or four.

It can be seen from Table 1 that the litter size is known for 30 species of bats of some 55 species from Australia. We urge others to help remedy this by publishing their observations on litter size and maternity sites. The situation in *Eptesicus pumilus*, where litter size appears to vary geographically and with roosting sites is worthy of much closer investigation.

Acknowledgements

We acknowledge with thanks the use of data of B. Dew, P. Aitken, P. D. Dwyer, J. E. Nelson, and L. S. Hall. R. K. Carruthers, W. Price, R. J. Burt, H. Battam, P. Freney, and R. Smith provided us with valuable specimens for study, and J. H. Calaby and L. S. Hall read and commented on the manuscript.

REFERENCES

Anciaux de Faveaux, F., 1960. Reproduction des Chiropteras du Haut-Katanga. *Bull. Soc. Spel. du Katanga* **2**: 23-30.

Douglas, A. M., 1962. *Macroderma gigas saturata* (Chiroptera, Megadermatidae). A new subspecies from the Kimberly Division of Western Australia. *W. Aust. Nat.* **8**: 59-61.

Dwyer, P. D., 1963. The Breeding Biology of *Miniopterus schreibersi blepotis* (Temminck) (Chiroptera) in north-

eastern New South Wales. *Aust. J. Zool.* **11**: 219-40.
Dwyer, P. D., 1966. Observations on the Eastern Horseshoe Bat in north-eastern New South Wales. *Helictite* **4**: 73-82.
Green, R. H., 1965. Observations on the Little Brown Bat, *Eptesicus pumilus* Gray in Tasmania. *Rec. Q. Vict. Mus. Launceston* **20**: 1-16.
Green, R. H., 1966. Notes on the Lesser Long-eared Bat, *Nyctophilus geoffroyi* in Northern Tasmania. *Rec. Q. Vict. Mus. Launceston* **22**: 1-4.
Herreid, C. F., 1964. Bat Longevity and Metabolic Rate. *Exp. Geront.* **1**: 1-9.
Johnson, David H., 1964. Mammals of the Arnhem Land Expedition pp. 427-515 in: Records of the American-Australian Expedition to Arnhem Land, Vol. 4 Zoology. (Ed. R. L. Specht) Melb. Univ. Press.
McKean, J. L., and Hall, L. S., 1964. Notes on Microchiropteran Bats. *Vict. Nat.* **81**: 36-7.
Nelson, J. E., 1964. Notes on *Syconycteris australis*. Peters 1867 (Megachiroptera). *Mammalia* **28**: 429-32.
Nelson, J. E., 1965. Movements of Australian Flying Foxes (Pteropodiae: Megachiroptera). *Aust. J. Zool.* **13**: 53-73.
Ratcliffe, F. N., 1931. The Flying Fox (*Pteropus*) in Australia. *C.S.I.R. Bull.* **53**: 1-81.
Ryan, R. M., 1963. Life history and ecology of the Australian Lesser Long-eared Bat, *Nyctophilus geoffroyi* Leach. M.Sc. Thesis, Univ. of Melb.
Ryan, R. M., 1966. Observations on the Broad-nosed Bat, *Scoteinus balstoni*, in Victoria. *J. Zool.* **148**: 162-66.
Ryberg, O., 1947. Studies on Bats and Bat Parasites. Bokforlaget svensk Natur. Stockholm.

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The Grinding Rocks at Munro

By Aldo Massola

There was once a *Kurnai* (a Gippsland tribesman) who had two sisters as wives. He was a selfish and irritable man, but a renowned hunter of wombats. When he found a wombat's hole he sent his two wives into it with sticks, and blocked the entrance to the hole after them. The women had to crawl along the hole until they found where the wombat was; then by tapping the ceiling of the hole with their sticks they signalled the position of the animal. The Kurnai then dug down to the wombat from above, after which he went back to the entrance of the hole and dug the women free.

On one occasion there was a male and a female wombat in one hole, and after going through the usual procedure of digging them out, he made a show of his generosity, by presenting with much ceremony the female wombat to his two wives. However, since under tribal law, female quadrupeds belonged to the women anyhow, they were not impressed, but only thought him all the more selfish and strange.

The two girls also often complained about his abnormal habit of sleeping in a different shelter, away from them, but could get no satisfaction from the bad tempered individual. They, therefore, decided to trap him.

The next time they went down a wombat hole he blocked the entrance as usual; but as soon as he started to dig down to the animal from the top, the girls dug themselves free, and seized him while he was in the hole. They thus had him in their power. They took him back to the camp and made a big fire, and when the ashes were hot they swept them away, leaving the warm earth underneath. At this warm spot they all camped together, and between them the girls subdued their irritable husband.

This myth, taken from my forthcoming book, *Bunjil's Cave,* is illustrative of the method adopted by the natives when hunting wombats, and was once told around the Kurnai camp fires. Like all aboriginal myths it alludes to actions and objects with which they were familiar. For instance, the procedure of the women when in the hole, was a common occurrence which they did not have to have explained. Nor did they have to be told how to warm the earth by lighting a fire upon it, or even what kind of a tool was used for the actual digging operation.

This tool was a stone hoe; in shape like a stone-axe head, but considerably larger, and much heavier. Like the axe-head it was often made from a large river pebble, and had one edge ground to a reasonable sharpness. The weight of the stone, coupled with the sharpness of its edge, would help it penetrate into the soil, while its width was handy for scooping out the soil thus loosened.

The grinding of the edge was done in the usual manner, by means of a coarse sandstone block. The axe or hoe was never ground *with* the block, but always *on* the block, and thus left an impression or groove upon it, roughly the width of the edge which was being ground. It is thus possible to determine what kind of implement was ground on any given block of sandstone by the width of the groove left upon it.

This method may also be applied to grinding rocks, which are natural outcrops of sandstone used by the aborigines for the same purpose as the portable sandstone blocks. However, the former are as rare in Victoria as the latter are common; a fact rather hard to explain, unless it was because the blocks were deemed to be an article of barter. Barter meant a good reason for intertribal gatherings, much like a country fair; when corroborees were held, marriages ar-

ranged, and old grievances settled by a fight. Thus a good time was had by all.

Sandstone outcrops, on the other hand, being non-portable, had to be at a place where the group could camp; and there grind the river pebbles or axe blanks at leisure into serviceable implements. An outcrop so located had the advantage of being firmly fixed, and thus easier to grind upon. Conversely, unless near a stone deposit or quarry, it had the disadvantage that suitably dense, and therefore heavy stones, had to be carried, perhaps for miles, to be ground. Consequently, the rocks had to be in the right place, and this might be one of the reasons for their rarity.

Including the present example, only four grinding rock sites have so far been reported in Victoria. The first was at Gellibrand, in the Otway Ranges. It was used for grinding average size axe-heads, and is singularized by bearing a carved rendering of a kangaroo track, the only rock carving so far found in Victoria. The second find was at Earlston, in Central Victoria. It is characterized by the narrowness of the grooves, thus showing that long, round-sectioned hand-axes, typical of Central Victoria, were ground upon it. The third find was at Boisdale, in Northern Gippsland, upon which ordinary sized axe-heads were ground.

The fourth find, hereunder described, was due to the keen observance of Mr. S. C. Fletcher, of "Eastwood", a property on the south side of the Princes Highway, not far from Munro, and about 6 miles east of Stratford, in Gippsland.

Mr. Fletcher was turning over virgin ground on his property when he came upon two small outcrops of ferruginous sandstone, barely protruding above the surface of the soil. They could have been easily bull-dozed, but

Photo: Author

FIG. 1. General view of group No. 2 rocks. (The rocks are barely visible upon the surface of the ground. Arrow at R.H. edge marks rock illustrated in Fig. 2.

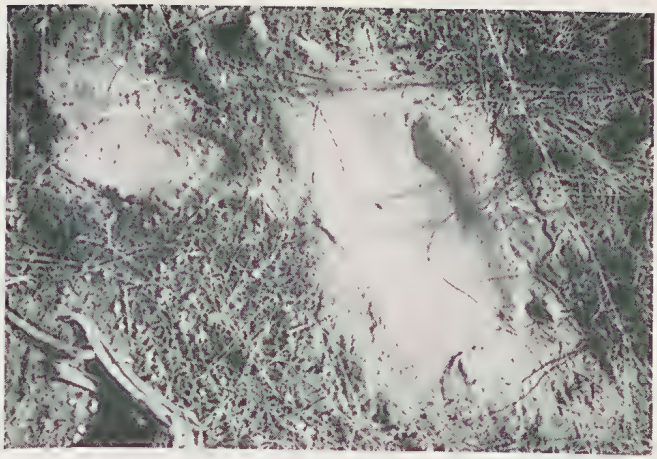


Fig. 2. Enlarged view of Rock A of group No. 2. (See text.)

Photo: Author

Mr. Fletcher noticed grinding grooves upon them, and refrained from moving them.

The first of these outcrops is about half a mile south-east from his house. It consists of a number of small detached rocks, all under 18 inches in diameter, and of three somewhat larger rocks, upon which grinding grooves are visible. These three consist of

(A) a rock 25″ by 14″, upon which there is one groove 13″ long by 8½″ wide and ¾″ deep;

(B) a rock, 36″ by 32″, with one groove, 7″ long by 3″ wide and ¼″ deep; and

(C) a rock, 30″ by 24″, with four grooves, all about ¼″ deep, ranging in width from 2″ to 2½″ and from 5″ to 8″ in length.

The second outcrop, about half a mile east of No. 1, is also strewn with small rocks; and the three largest of these, outcropping in a line running east and west, bear grooves—

(A) is 39″ by 22″ and shows three grooves, ranging from 8″ to 9″ in length, 2″ to 6″ in width, and from ¼″ to 1″ in depth;

(B) is 28″ by 12″ and also has three grooves ranging from 7″ to 12″ in length, 2½″ to 6″ in width, and ¾″ to 1″ in depth;

(C) a rock, 44″ by 15″, bears two grooves, one 9″ long by 3″ wide and ½″ deep, and the other 13″ long, 10″ wide and 1¼″ deep.

It is obvious to anyone familiar with axe-heads, that some of these grooves, i.e. one in the first group and four in the second group, are much too wide for ordinary axes. These five grooves range, in width, between 5″ and 10″, and they would be wide axes indeed with such a cutting edge. These five therefore, were depressions left in grinding "super-axes", that is, the hoes which these people used for instance in digging out wombats, as related in the foregoing legend. Suitable pebbles for making both hoes and axes could be obtained from the Providence Ponds, less than 2 miles away.

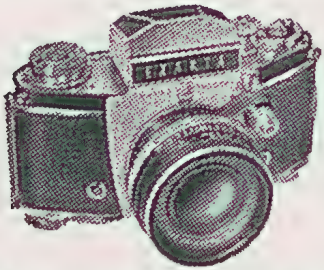
To make the picture complete we must now take a look around the immediate vicinity of these grinding rocks. About 150 yards north of No. 2 outcrop there is a low sand hill, running east and west. The sand is compact, grassed, and bracken-covered. A few scattered stringybark saplings grow upon it; perhaps indicating a former forested area.

At the time of my visit, 15th May, 1967, no camp debris, stone chips, fragments of bone, or fire scorched freshwater mussel shells were seen; but this could only be expected under the present conditions, because the sand on the hills needs to be wind "blown" before these objects can be found. A few inches below the surface the sand is dark, as if it had once been mixed with charcoal. This could be due to aboriginal camp fires and cooking ovens, but could also be due to bushfires, so that by itself, this is no indication of human activity.

However, at the northern base of the sand hill there is a large depression in the ground, on which grows *Xipha* and other water loving reeds. This depression was in fact a swamp, until it was drained by the excavating of a dam on its west side into which the swamp water percolated.

It now becomes obvious that this was a camp site. The aborigines would find it hard to resist a sand hill close to a permanent supply of water, with the added attraction of two outcrops of ferruginous sandstone.

Mr. Fletcher is to be congratulated upon his discovery, and thanked for his decision to preserve it. Let us hope that his example will be followed by other landowners who may be fortunate in having aboriginal antiquities in their keeping.



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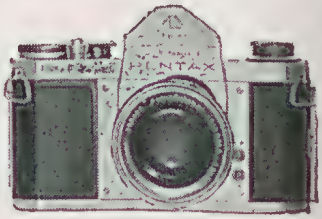

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Mammal Bones in the Buchan District

By N. A. Wakefield*

Introduction

This article is supplementary to reports that were published previously (Wakefield, 1960a, 1960b) on collections of sub-fossil mammal bones from caves in the Buchan district of eastern Victoria. Those reports dealt with deposits of owl pellet material from the Pyramids Cave and Mabel Cave, as well as with two bone accumulations in dens of *Dasyurus viverrinus* (syn. *D. quoll*).

Since then, both the owl pellet deposits have been excavated further and additional material from them studied. Secondly, taxonomic investigation of some small dasyurid species has been carried out (Wakefield and Warneke, 1967), and this has allowed correct identification of specimens which had been determined previously as *Antechinus flavipes*. Thirdly, material of the Michrochiroptera, which was not dealt with originally, has now been classified.

The title of the present article omits the adjective "Recent", for much of the material from the Pyramids Cave is of late Pleistocene origin.

Mabel Cave

The owl pellet material at this site was some square yards in extent and several inches deep. Beneath it, a layer was discovered, a few inches in thickness, of faeces of *Petrogale penicillata*, the Brush-tailed Rock-wallaby. Underneath that was a third stratum containing bones of prey of *Dasyurus viverrinus*.

The *Dasyurus* den material was divided into two fractions. Part of it had been flood-washed and the remainder had not. The disposition of the two lots indicated that the unwashed material was accumulated subsequent to flooding which inundated the water-washed material.

This stratification provides excellent opportunity for analysis and radio-carbon dating of three successive mammal faunas of the locality. Further interest is provided by evidence of aboriginal occupancy amongst the unwashed *Dasyurus* den material.

It is proposed that a full analysis will be made of the Mabel Cave deposit, and the results published, within the next few years.

Pyramids Cave

Since mid-1962, the Pyramids Cave deposit has been the subject of a research project, and a detailed report of this work is being prepared. The purpose of the present article is mainly to off-set descrepancies which occurred in the 1960 articles.

Table 1 sets out an up-to-date analysis of the marsupial material in the deposit, while Table 2 deals with the placental mammal material, and the notes which are appended explain points in connection with the data presented.

The minimum number of mammals represented in the deposit exceeds 11,000 individuals, about 77 per cent

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TABLE 1

Analysis of Marsupial Remains in Pyramids Cave Deposit, Showing Minimum Numbers of Individuals in each Age Category

(The numbers in parenthesis refer to explanatory notes)

Species	Minimum Numbers of Individuals	
	Recent	Pleistocene
Dasyuridae		
Sminthopsis cf. *leucopus* (White-footed Dunnart) (1)	237	356
Antechinus stuartii (Brown Phascogale) (2)	311	1238
Antechinus swainsonii (Dusky Phascogale)	98	390
Phascogale tapoatafa (Tuan)	2	19
Dasyurus cf. *viverrinus* (Eastern Quoll) (3)	2	1
Sarcophilus laniarius (Giant Devil) (4)	—	1
Peramelidae		
Isoodon obesulus (Brown Bandicoot) (5)	20	—
Perameles nasuta (Long-nosed Bandicoot)	26	81
Phalangeridae		
Acrobates pygmaeus (Feathertail Glider)	136	1103
Cercartetus nanus (Pigmy-possum)	146	979
Cercartetus lepidus (Little Pigmy-possum)	—	111
Burramys parvus (Mountain Pigmy-possum) (6)	—	141
Gymnobelideus leadbeateri (Leadbeater's Possum)	1	221
Petaurus breviceps (Sugar Glider)	36	197
Petaurus norfolcensis (Squirrel Glider)	6	—
Petaurus australis (Fluffy Glider)	1	—
Trichosurus sp. (Brush-tailed Possum) (7)	1	—
Pseudocheirus peregrinus (Common Ringtail)	9	53
Schoinobates volans (Dusky Glider)	—	5
Macropodidae		
Potorous tridactylus (Potoroo)	13	14
cf. *Petrogale penicillata* (Brush-tailed Rock-wallaby) (8)	—	1

of which are Pleistocene and about 23 per cent of which are Recent in origin.

Some radio-carbon dates have been obtained for samples of bone from the Pyramids Cave, and other samples are being assayed at present. The results will not be discussed here except to note that the average age of the Recent material appears to be of the order of 2500 years, and the average age of the Pleistocene material appears to be of the order of 15,000 years.

TABLE 2

Analysis of Placental Mammal Remains in Pyramids Cave Deposit, Showing Minimum Numbers of Individuals in each Age Category

(The numbers in parenthesis refer to explanatory notes)

Species	Minimum Numbers of Individuals	
	Recent	Pleistocene
RODENTIA		
Muridae		
Hydromys cf. *chrysogaster* (Eastern Water-rat)	—	1
Rattus fuscipes assimilis (Bush-rat)	303	2225
Rattus lutreolus (Swamp-rat)	52	12
Pseudomys fumeus (Smoky Mouse)	225	817
Pseudomys oralis (Coast Pseudomys)	502	—
Pseudomys sp. (Pseudomys) (9)	—	165
Pseudomys novae-hollandiae (New Holland Mouse)	134	43
Mastacomys fuscus (Broad-toothed Rat)	194	97
Conilurus albipes (White-footed Rabbit-rat)	31	?1
Melomys cervinipes (Tree-rat) (10)	—	38
CHEIROPTERA		
Rhinolophidae		
Rhinolophus megaphyllus (Eeastern Horse-shoe Bat)	1	—
Vespertilionidae		
cf. *Eptesicus pumilis* (Little Brown Bat)	—	3
cf. *Chalinolobus morio* (Chocolate Bat)	1	3
Chalinolobus gouldii (Gould's Bat)	1	3
Nyctophilus geoffroyi (Lesser Long-eared Bat) (11)	8	29
Nyctophilus timoriensis (Greater Long-eared Bat)	3	4
Pipistrellus tasmaniensis (Pipistrell) (12)	3	6
Miniopterus schreibersi (Bent-wing Bat) (13)	1	153
Molossidae		
Tadarida australis (White-striped Bat)	—	1

EXPLANATORY NOTES

1. In the 1960 articles, material of *Sminthopsis* was not distinguished from that of *Antechinus stuartii*. Figure 4b (P 20623) on page 171 of *Vict. Nat.* October 1960, is *Sminthopsis*, not *Antechinus*.

2. The identity of *Antechinus stuartii* is discussed at length by Wakefield and Warneke (1967). *A. flavipes* does not occur in the Buchan bone deposits, and this name should be replaced by *A. stuartii* throughout the two 1960 articles.

3. This material comprises a few isolated teeth, one or more of which may belong to *Dasyurus maculatus* rather than *D. viverrinus*.

4. A single upper incisor provides the only record to date of *Sarcophilus* in eastern Victoria. The presence of this tooth, as well as of small fragments of large bones, indicates that the outer chamber of the Pyramids Cave was once used as a *Sarcophilus* den, presumably before it was occupied by owls. The tooth is about 15 per cent greater in linear dimensions than the corresponding incisor of *S. harrisi*. This identifies it as belonging to the extinct Pleistocene "giant devil", *S. laniarius*. (Ref. Gill, 1953.) However, the taxonomic status of the latter needs investigation.

5. A misprint should be corrected on page 228 of *Vict. Nat.* December 1960. The data for *Isoodon obesulus* should have read "9 (0)", not "0 (1)".

6. The discovery of a living specimen of *Burramys parvus* (now No. C 7290, National Museum of Victoria) was reported in newspapers and other publications late in 1966.

7. The specimens of *Trichosurus* have not been identified specifically. Their presence in the Pyramids Cave is due to these animals living, and dying, in the cave.

8. The fragmentary remains of medium-sized macropodids (cf. *Petrogale*) may be due to the cave having been used as a *Sarcophilus* den.

9. This *Pseudomys* material was not distinguished in the original reports (e.g. Table on p. 235 of *Vict. Nat.* December 1960) from *P. oralis* (syn. *P. australis oralis*). There are no Recent specimens of the former nor Pleistocene specimens of the latter in the Pyramids Cave deposit.

10. The presence of *Melomys* in the Pyramids Cave deposit is recorded by Mahoney (1965). *Melomys* is not known as a modern animal from anywhere south of north-eastern New South Wales.

11. The numbers for *Nyctophilus geoffroyi* are tentative. This material, and that of some other small bats in the collection are to be re-examined.

12. *Pipistrellus tasmaniensis*, though known to occur in Tasmania and New South Wales, has not been recorded alive in Victoria. Its occurrence in modern cave deposits indicates however that it is present in this State (Ref. Hamilton-Smith, 1965).

13. The comparative abundance of *Miniopterus schreibersi* in the Pleistocene fraction of the deposit and its rarity in the Recent fraction, indicates that the species used this particular cave as a home in the earlier period. (Similarly, remains of *Rhinolophus megaphyllus* are abundant in the Mabel Cave deposit, because *Rhinolophus* uses Mabel Cave as a home.)

References

Gill, E. D. (1953)—Distribution of the Tasmanian Devil, the Tasmanian Wolf, and the Dingo in S.E. Australia in Quaternary Time. *Vict. Nat.* **70**: (5): 86-90.

Hamilton-Smith, E. (1964)—Australian Cave Bats. A Provisional Guide to Identification. C.S.I.R.O. Division of Wildlife Research, Canberra.

Mahoney, J. A. (1965)—The identity of *Mus burtoni* Ramsay 1887 (Rodentia, Muridae, *Melomys*) from the neighbourhood of Derby, Western Australia. *J. Roy. Soc. W. Aust.* **48**: 91-5.

Wakefield, N. A. (1960a)—Recent mammal bones in the Buchan district—1. *Vict. Nat.* **77** (6): 164-78.

Wakefield, N. A. (1960b)—Recent mammal bones in the Buchan district—2. *Vict. Nat.* **77** (9): 227-40.

Wakefield, N. A. and Warneke, R. M. (1967)—Some revision in *Antechinus* (Marsupialia)—2. *Vict. Nat.* **84** (3): 69-99.

A Centenary Review of the Helmeted Honeyeater

By Roy P. Cooper

One hundred years after the naming of the Helmeted Honeyeater, and the publishing of a painting and a full description of this species, it is in danger of becoming another one of our many extinct species of birds and animals.

In 1886 Sir William Jardine obtained a collection of "ordinary" Australian birds in Edinburgh. How the birds were "obtained" or from where they had been despatched to Scotland is not recorded, but among them Jardine recognized a bird that was unlike any other species that had been described.

A "well-executed drawing, made by his daughter, Mrs. Strickland", of the bird, was sent by Jardine to John Gould, with a note that he believed it to be new to science.

Gould "at once perceived that Sir William was right in his conjecture, and that the bird was not only new, but one of the finest species of the genus *Ptilotis* yet discovered".

The original specimen was then sent by Jardine to Gould in London, and it was exhibited by Gould at the December, 1866, meeting of the Zoological Society of London, where the name of *Ptilotis cassidix,* given by Jardine, was confirmed.

A second specimen was found shortly afterwards in Edinburgh, and other skins arrived in London. These latter birds were obtained at "Western-Port Bay, near Port Phillip Heads, in the Colony of Victoria".

Gould made a painting from one of the skins, and wrote a description of the new species, but for some reason the publication was delayed for a year. It was not until December 1, 1867, that the part of the *Supplement to the Birds of Australia* that contained the new bird, was issued.

A number of these birds must have been collected during 1867, possibly by the same collector, as Professor McCoy, Director of the National Museum of Victoria, received two skins, a male and a female, from Bass River, near Western Port Bay.

As Jardine had not published any description of his specimen in London in 1866, McCoy described the new species, naming it *Ptilotis leadbeateri* and the paper was published in the *Annals and Magazine of Natural History* (Ser. 3), 20: 442. By a remarkable coincidence both journals appeared on the same day, December 1, 1867.

However, as Gould's description was accompanied by a plate, it must be accepted, and as Jardine did not describe the new species, the name of *Ptilotis cassidix* must be attributed to Gould.

With the exhibiting of Jardine's specimen in London during December 1866, and the publishing of Gould's *Supplement,* with a coloured plate and a description on December 1, 1867, it is reasonable to take the mean of these two dates, namely June 1867, as the time of the original discovery, just one hundred years ago.

As the Field Naturalists Club of Victoria has taken a leading part in the study of this rare and beautiful species, particularly in the early years of the Club, it is fitting that during

this centenary year, a review of the species should again appear in the pages of the *Victorian Naturalist.*

Although the bird was first shown in London in 1866, the first nest and set of eggs were not recorded until 1884. The skins that were "obtained" in Edinburgh and London in 1866 and 1867 were obviously collected by a professional collector and sent to England via a dealer in Melbourne. Collectors and dealers in all kinds of natural history specimens were common in Sydney and Melbourne at that time. However, the first nest and a set of eggs were not taken by a professional collector, but were obtained by a member of the Field Naturalists Club of Victoria, A. J. Campbell, during the first camp-out that was held by the Club.

The details of the camp-out, which was held at Olinda Creek, near Lilydale, from November 7 to 9, 1884, have been published in the *Victorian Naturalist,* Vol. 1, pp. 110-2.

Thus we find that the first set of eggs and the first nest were discovered and taken during the first camp-out of the F.N.C.V., and the results published in the first volume of the *Victorian Naturalist.*

The collecting of the nest and eggs was not without incident as the report on the camp-out clearly indicates.

"The ornithologists were successful in taking for the first time the nest and eggs of the rare and certainly the most beautiful of all the Australian Honeyeaters, viz., the helmeted or sub-crested, *Ptilotis cassidix,* (Jardine) or *P. leadberteri,* (McCoy), the taking of which nest involved a good ducking for two of the naturalists, as the tree in which it was situated gave way and precipitated the captors, nest and all, into the running stream."

A more complete description of this event is given by A. J. Campbell in his book, *Nests and Eggs of Australian Birds.*

From the first discovery of this species until the present day all writers have stressed the rareness and the beauty of the Helmeted Honeyeater.

Forty-four years after the naming of the species in London in 1866, F. E. Wilson and L. G. Chandler published (*Emu,* 10: 37-40) the first detailed field notes, and their opening remarks are significant.

"As so little is known concerning the habits of the rare and beautiful Helmeted Honeyeater (*Ptilotis cassidix*), the following notes, collected during the past two seasons, may be of interest." These notes were full of interest at that date, and they are still the most detailed observations that have been published.

In 1933, Charles Barrett, writing about the Helmeted Honeyeater in the special issue of the *Victorian Naturalist* (Vol. 50, p. 162), stated—

"Up till 1900, when Campbell's great work was published, only four nests of the Helmeted Honeyeater had been taken; all on the Olinda Creek. Egg collectors and bird observers, year after year, searched the Olinda Creek country and other localities for nests of the rare and beautiful honeyeater, the only bird known which is exclusively Victorian.

"For many seasons the search was fruitless. Then F. E. Wilson and L. G. Chandler discovered a small colony of Helmeted Honeyeaters on the Cardinia Creek, thirty miles east of Melbourne. Since, raids have been made by egg collectors; and for several years it was feared that *Meliphaga cassidix* had disappeared from Beaconsfield, as apparently it did long ago from Olinda Creek Valley. Happily the fear was groundless. The honeyeater had moved higher up the creek, and today forms a flourishing colony. Strictly protected, our "exclusive" bird may become fairly numerous at Beaconsfield and in other parts of south-eastern Victoria."

Other writers were more pessimistic than Barrett and did not expect the Helmeted Honeyeater to "become fairly numerous". They remarked, even as they took the eggs, that the species would remain very rare.

F. E. Wilson (ibid. 50: 160), dis-

Photo: Roy P. Cooper

Helmeted Honeyeater (*Meliphaga cassidix*) on nest.

cussing various egg clutches that he had taken of *cassidix* remarks—

"The most memorable clutch that I ever took was one consisting of a pair of *cassidix* eggs, together with a pair of eggs of the Pallid Cuckoo." . . . . I know of no bird more heavily parasitised by Cuckoo than the Helmeted Honeyeater, and in my opinion this fact has contributed largely to the rarity of the bird.

When considering the relationship between the Yellow tufted Honeyeater (*Meliphaga melanops*) and the Helmeted Honeyeater (*M. cassidix*), George Mack, in the same part of the *Victorian Naturalist,* was of the opinion that

". . . . it would appear that *melanops* is the younger, more virile species, and that *cassidix* approaches nearer the original stock, and, even under the most favourable conditions would be unlikely to increase in numbers or extend its range."

However, the records of its distribution as shown on the map in the same publication, have since been queried; and it would appear that *cassidix* was even more restricted in its range than was considered at that time. Certainly the habitat of the type locality at Bass River near Western Port Bay had been completely destroyed; likewise the area where the first nest and a set of eggs were collected on Olinda Creek, near Lilydale.

Two more "firsts" regarding the Helmeted Honeyeater were recorded in the special issue. The first photograph, taken by Charles Barrett, of a nest which contained an egg of the honeyeater and one of the Pallid Cuckoo, was published.

In another special article, "Photographing the Helmeted Honeyeater", A. H. E. Mattingley described his experiences in photographing the honeyeater, which had constructed its nest in bracken, a most unusual site, and two photographs were published. The photograph shown on p. 166 of **84**, 6; is one, and is equal in quality to any photograph that has been taken since.

It is obvious from the foregoing remarks that in 1934, sixty-eight years after the naming of the Honeyeater, it was still considered to be a rare species and that there was little chance of it becoming less uncommon.

On November 30, 1947 (*Emu,* 47: 230-1), a party of thirty members of the Royal Australasian Ornithologists Union searched part of the Cardinia Creek Valley, near Upper Beaconsfield, to take as accurate a census as possible of the Helmeted Honeyeater. The party was divided into four groups and the banks of the creek were surveyed in both directions, and on both sides of the creek.

At least fifty individual birds were seen by the several parties, with three nests, two containing eggs and one with two young and one egg to hatch.

Taking into account that members of no party saw personnel of any other party en route, and considering the extreme stationary nature of the birds, there was probably no overlapping and inclusion of the same birds in more than one list. Allowing for the thick nature of the scrub, the fact that many birds were seen singly and may have had mates, sitting or otherwise engaged and the habit of the species of frequenting the tops of the eucalypts, it is likely that only half of the birds in the valley were seen. An estimate of 100 birds was considered to be reasonable.

The authors of this report were of the opinion that

". . . the future of the Helmeted Honeyeater is doubtful".

I took part in this survey, being in Melbourne on a visit from Sydney, and it was my first sighting of *Meliphaga cassidix*. Little did I think at that time that twenty years later I would be pleading for assistance to help preserve this rare and beautiful honeyeater.

The following week Messrs. A. H. Chisholm and E. S. Hanks took me to Yellingbo where I was able to photograph the Helmeted Honeyeater at several nests. The area was near the bridge and the honeyeater appeared to be in all the tall manna gums and swamp gums, as well as the low undergrowth.

My next visit to the same area was on May 13, 1950, when I recorded 30 birds in the area between the two bridges, including 5 birds on the one branch, touching each other.

In February 1967, in the same area, I recorded *two* birds.

The decline in number of the Helmeted Honeyeater over the years was apparent to Mr. Jack Hyett, who made a survey, with the help of members of the Victorian Ornithological Research Group (VORG) in 1962-1963.

The survey revealed that there were less than 300 individual birds of this rare and beautiful honeyeater, the only bird that is to be found nowhere other than in a very restricted part of Victoria.

A comprehensive report was submitted to the Fisheries and Wildlife Department, and in March 1963 the Wildlife Reserves Investigation Committee visited the sites of a proposed reserve for the Helmeted Honeyeater. No further action appears to have been taken until early in the current year.*

During March and April 1967, another survey was made by Hyett and his assistants, and the alarming reduction in number to a count of 166 birds was revealed. Even allowing that all birds were not counted, which would be the same in principle as in 1963, the reduction in number to almost half of the 1963 total would be constant.

* [In 1966, areas on the Cockatoo Creek and Sheepstation Creek were established as part of the Yellingbo Wildlife Reserve. Ed.]

On April 7, 1967, the following press statement was released. This statement is published in full as it is of paramount importance to understand what is behind the reserve.

. . . . Important new Wildlife Reserve established

"The Chief Secretary, Mr. A. G. Rylah, today announced the establishment of an important new State Wildlife Reserve. This will be located at Yellingbo on the Woori Yallock Creek System. It will be under the control of the Fisheries and Wildlife Department.

This reserve is the site for the largest of the two known colonies of the rare Helmeted Honeyeater (*Meliphaga cassidix*), the only species of bird confined entirely to Victoria. Mr. Rylah said that if this bird is to remain a feature of Victorian wildlife it is essential that its habitat be reserved and managed in such a way to favour the remaining colonies.

The Yellingbo Wildlife Reserve is some 412 acres and consists of the frontages along part of the Worri Yallock, Cockatoo and Sheep Station creeks. While the conservation of the Helmeted Honeyeater has been the main theme in the reservation of this area, the reserve also supports populations of possums, glider possums and bandicoots, many species of bush birds and many platypus in the creeks themselves.

The rare Helmeted Honeyeater is largely confined to the creek margins, both within the reserve, and also in the adjacent freehold land. The survival of this species is not only dependent upon the management of the reserve, but also on the co-operation of adjacent landholders and the visiting public.

The major threat to this small population is interference or destruction of its habitat. Already much of the vegetation along the creeks has disappeared, and parts of the area are no longer suitable for the Helmeted Honeyeater and the lost vegetation will have to be re-established.

A working group of local landholders and ornithologists has already been set up to assist the Department in its programme in this area, and it is only by the continued co-operation of all interested people that this unique Victorian bird will be saved from extinction.

Yellingbo is a State Faunal Reserve, one of the three categories of State Wildlife Reserves. It is the 11th Faunal Reserve, and the 26th Wildlife Reserve, which now total 124,760 acres."

At last, in the centenary year of its discovery the Helmeted Honeyeater (*Meliphaga cassidix*) has had a complete Wildlife Reserve established in an endeavour to preserve this species.

In spite of all the efforts that Government Departments and interested bird lovers can do to protect this bird it could become extinct within the next decade unless the general public—land-owners, shire councillors, school teachers, children of all ages, members of Parliament, government officials, campers and the general public—co-operate fully in seeing that it and its habitat are fully protected.

This paper has reviewed the history and commented on the present position regarding the number, and the threat to the survival of the Helmeted Honeyeater. A full account of the biology and ecology of this rare species, as far as is known today, had been published in the current issue of the *Australian Bird Watcher*, and it should be read in conjunction with this paper.

It is a challenge to all Victorians to see that the rare and beautiful Helmeted Honeyeater is saved from extinction, so that in another century our children's children may enjoy the same privileges with which we are endowed.

Mammal Survey Group

Mammals of the Metropolitan Area

In addition to the surveys being undertaken further afield, the Mammal Survey Group is commencing a survey of the mammals of the Metropolitan area. This will be based largely on locality records for mammals in the Melbourne suburbs, with attention being directed initially at the two possums common in Melbourne, the ringtail *Pseudocheirus lanuginosus* and the brushtail *Trichosurus vulpecula.*

The group therefore requests all F.N.C.V. members for help. Reports of sightings of either of these possums (or any other non-domestic mammal) would be greatly appreciated in expanding our records. All data will be plotted on a map of the Melbourne area. Specific details of localities are needed, so that they can be pin-pointed in a street directory, with details of date, time of day and surroundings.

Information should be sent to the Hon. Secretary, Mammal Survey Group, 36 Percy Street, Balwyn.

Book Reviews

The Lichens and Mosses of Mac.Robertson Land

by Rex R. Filson

Publication No. 82 of the Antarctic Division, Department of External Affairs, 1966. 10″ x 7½″. 169 pages—including 13 full-page plates in colour, 28 in half-tone and 40 figures (embracing maps). Price $9.00.

It is always a pleasure to commend an attractive, painstakingly accurate monograph, but doubly so when the author happens to be a member of both the Field Naturalists Club of Victoria and the staff of the National Herbarium, Melbourne. Mr. Rex Filson, one of those rare investigators who combine high enthusiasm with scientific ability and consummate artistic skill, has produced a floristic handbook of superb quality. Printed on art paper and strongly bound by Brown, Prior, Anderson Pty. Ltd., this book also demonstrates what scrupulous care has been exercised by the printers.

Antarctica, for its size (about 1½ times that of Australia), is much more deficient in vegetation than any other comparable area in the world. Only around the coastal fringe are plants to be found at all, and the great majority of these consist of lowly encrusting rock-lichens. After exhaustive searching, while stationed at Mawson during 1962, Mr. Filson found 26 species of lichens and two of mosses in the Mac.Robertson Land portion of the Australian Sector. These are set out in his book, with detailed botanical descriptions, distributional maps for each, coloured figures to scale and meticulous drawings made from microscopical sections. Twenty-two pages (with some good photographs) are devoted to a descriptive survey of rock outcrops in Mac. Robertson Land, with lists of plant species for every range and nunatak. Six lichens and one moss are presented as new species, and provided with Latin diagnoses. Botanical literature of any sort concerning the Antarctic is scattered and scarce, and, in the reviewer's opinion, the present contribution is one of the foremost, if not the best, local flora of this vast region yet to appear. It will certainly find a place in most botanical libraries, and those of cryptogamic botanists; but even nature-lovers with little or no knowledge of lichens will be glad enough to pay the nine dollars for a very choice, beautifully illustrated piece of "Australiana". Offered for sale in February, *The Lichens and Mosses of Mac.Robertson Land* may be obtained from leading book-stores or direct from the Publications Section, Government Printing Office, Canberra.

J. H. Willis

Waterfowl In Australia

by H. J. Frith

Angus and Robertson Ltd. Price $10.

Dr. Frith, who is chief of the Division of Wildlife Research with C.S.I.R.O., has produced his second book, and again an outstanding publication.

His first book, *The Mallee Fowl*, was a remarkable story on the life history of a unique species.

This book deals with the waterfowl of Australia—the geese, swans, and ducks; 23 species in all, with 19 native, 2 rare visitors, and 2 introduced species. Every aspect of their life history is discussed in detail, which includes references, vernaculars, description of adults and young, voice, routine, field recognition, relationships, distribution and movements; together with excellent maps, feeding, breeding, nest and eggs, clutch size, incubation, development of the young, and the very important status of each native species. Most of the information has been collected in the field by Dr. Frith and members of his division, and he only relies on two outside obser-

vers for some important notes on two of the species; namely the Cape Barren Goose and the Blue-billed Duck. The book contains a wealth of information, the kind of grasses each species feeds on, the seasonal movement patterns, banding results and recoveries, the effect of ducks in rice fields, and many other aspects in the life of waterfowl. The status of some of the rarer waterfowl is given with very forthright statements, such as that which he makes regarding the White (White-quilled) Pigmy Goose—

"It has declined greatly in over-all range, but where it still persists it does in reasonable numbers. The race is restricted to Australia and in particular to one part of one State. As the custodians of most of the world population of the Australian race of the White Pigmy Goose, a solemn responsibility rests on the Queensland Government to preserve it."

The book contains beautiful colour plates by Betty Temple Watts, and some excellent photographs by Ederic Slater and the author. The field identification drawings of waterfowl at rest, in flight, and overhead, are also the work of Dr. Frith. The author has used new vernaculars for three of the species, and his choice of White Pigmy Goose for the White-quilled Pigmy Goose is, in my opinion, a logical one; but I do not altogether agree with his names for the Tree-ducks. The present Checklist vernaculars are Plumed Tree-duck and Whistling Tree-duck. Dr. Frith has named them Grass Whistle-duck, and the Water Whistle-duck. He explains that as they are both plumed, and both whistle, the present vernaculars are confusing, and also neither has much association with trees. He prefers the Northern Territory name of Whistle-duck. I would like to retain the name Tree-duck, and as the legs of each species are different in colour, would suggest Black-legged Tree-duck for the Whistling Tree-duck, and Red-legged Tree-duck for the Plumed Tree-duck.

Waterfowl in Australia is undoubtedly a classic amongst the books on waterfowl throughout the world, and Australians should be most proud of this work by Dr. Frith. I would heartily recommend it for the library of every ornithologist and nature lover who can afford it.

Roy Wheeler

The Collection and Preservation of Insects

Handbook No. 1

By K. R. Norris

(*Published by The Australian Entomological Society*)

Paper-backed, approx. 5½" × 8½". 34 pages with 8 b. and w. detailed illustrations.

Available from the publishers, c/- Dept. of Entomology, University of Queensland. Price $1.00.

To partly overcome the problem of being unable to publish every scientific writing offered to the *Journal of the Australian Entomological Society*, the Executive of the Society, in consultation with the other Officers, has decided to issue a series of Handbooks to cover a wide field of entomology.

This is the first of the series, and in it, Mr. K. R. Norris has prepared a most comprehensive work, dealing with a most important part of practical entomology.

Methods of collection are dealt with initially, and here, details of collecting equipment, killing agents and their usage, and insect traps are dealt with quite fully.

The chapter on Preservation provides information on Dry and Wet methods, Microslides and other special mounts, details of dissection, and a section on the Field Preservation for Study of Chromosomes.

Physical hazards, Museum pests, Mould and Moisture problems, and Restoration of damaged insects are dealt with in the final chapter. A list of references, together with a summary of preservation methods and a subject index completes the Handbook.

G.M.W.

Field Naturalists Club of Victoria

General Meeting—12 June 1967

The meeting was opened by the President, Mr. W. L. Williams, with a number of seats vacant, due no doubt to the public holiday.

The Secretary read a letter from Mr. J. A. Baines, tendering his resignation from the position of Book Sales Officer at General Meetings. The President said he regretted it was necessary for Mr. Baines to relinquish his position, as he has done an excellent job in that capacity. Mr. Garnet moved that in view of the splendid work of Mr. Baines, it be recorded in the minutes as such. Seconded Mr. Allen.

The President invited applications to fill the vacancy left by Mr. Baines. Mrs. Strong offered to take over the position.

The subject of the evening, "Excursion to the north-east of Victoria", was delivered by Miss Joan Forster. She began by saying how pleased she was to be able to share some of the things which gave pleasure to herself and party who were fortunate to make the trip to the north-east at Christmas '66. The excursion left on Boxing Day, travelling via the Maroondah Highway to Buxton, where a stop was made to see the not so common Silver Gum (*Eucalyptus crenulata*). Also growing in the area were scattered clumps of the Woolly Tea-tree (*Leptospermum lanigerum*). The party then travelled through Alexandra, across the Strathbogie Ranges to the Hume Highway, then to Wangaratta; which was to be the base from which daily excursions were to take place. Excellent accommodation awaited the party at the Maximus Motel. Before describing each daily excursion in detail, Miss Forster gave a brief account of the Geology of the north-east of Victoria. The main area covered during the excursion was a portion of the Regional Metamorphic Belt which is a feature of the north-east of Victoria. The basement rocks are Ordovician age. At the end of the Ordovician Period these sedimentary rocks were sharply folded. Igneous injections penetrated through weaknesses caused by the folding, resulting in highly metamorphosed rocks such as Gneiss and Schists. These were seen in many places between Granyo and Tallangatta and also on the road to the Bogong High Plains. Mount Buffalo is a granite mass which intruded the existing rocks in mid to late Devonian times. Other granites seen were at Beechworth and in the Warby Ranges. The speaker then described each daily trip in detail beginning with the first which was to Mount Buffalo. On reaching the Chalet, members were enchanted by the glorious views. Seen here was a

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F.N.C.V. Publications Available for Purchase

FERNS OF VICTORIA AND TASMANIA, by N. A. Wakefield. The 116 species known and described and illustrated by line drawings, and there are 30 photographs. Price 75c.

VICTORIAN TOADSTOOLS AND MUSHROOMS, by J. H. Willis. This describes 120 toadstool species and many other fungi. There are four coloured plates and 31 other illustrations. New edition. Price 90c.

THE VEGETATION OF WYPERFELD NATIONAL PARK AND A CHECK LIST OF ITS VASCULAR FLORA, by J. Ros Garnet. Coloured frontispiece, 23 halftones, one hundred line drawings of plants and a map. Price $1.50.

Address orders and inquiries to Sales Officer, F.N.C.V., National Herbarium, South Yarra, 3141, Victoria. Payments should include postage (4c on single copy).

large and beautiful Snow Gum (*Eucalyptus pauciflora*), while below the look-out *Eucalyptus mitchelliana* was seen growing in crevices on the cliff face, gaining support from the crumbling rock, and moisture from the crevice. Clinging amongst the rocks it was delightful to find *Westringia sentifolia*, the Hoary Sunray (*Helipterum albicans*), *Celmisia longifolia*, the Silver Daisy, Billy Buttons, *Craspedia unifolia* and *Helichrysum semi-popposum* or Clustered Daisy. Also seen here were several Brachycomes, including *Brachycoma nivalis*. At Dingo-Dell, lunch was taken during a thrilling performance of a lyrebird in the thickets nearby. Here members saw the beautiful *Grevillea Victoriae* growing beside *Prostranthera rotundifolia*.

Some members also saw the Green Mint bush *Prostranthera walteri*. The party then travelled to an area near Tatra Inn, which is of special interest to naturalists at the present time. Before departing, some members climbed to Bent's look-out, where stunted Eucalypts were seen growing from the parallel joint planes in the Granite.

Although there were not many birds active, there were Striated Pardalotes in the Eucalypts near the Chalet, and Olive Whistlers and Crecent Honeyeaters near the Sentinel. On the second day the party made a trip around the Hume Weir which was filled almost to capacity. On reaching the spillway, Cormorants and Plumed Egrets were seen fishing in the river below. Many water birds were seen at intervals en route including Black Duck Pelicans, Black Swans, Little Grebes, White Egrets and White-faced Herons. The margins of the dam were more lush than usual after the rain, and the Yellow Autumn Lily, *Tricoryne elatior*, was there, and also Paterson's Curse. In the paddocks near Tallanggatta, large flocks of White Ibis and Straw-necked Ibis were seen; also Spur-winged Plovers and one Royal Spoonbill.

The next day brought us a 7.30 a.m. start for Rocky Valley and the Bogong high plains. After a stiff climb up the mountain, the party crossed the dam wall at Rocky Valley and had lunch in a "Scotch mist". Some members were content to look at the view of the dam with patches of *Kunzea muelleri* growing along its shores. From the McKay Portal, members strolled down the road where many shrubs and flowers were in full bloom.

The following day the party journeyed to Beechworth and was met by Mrs. Francis Gladstone, who led the party to places of interest, ending at Woolshed Creek. Here they engaged in gemstone hunting for Agates, Jaspars, and Amethysts.

The following day the party visited the Warby Ranges, where they enjoyed the hospitality of Miss Dorothy Nason on her property; which is a sanctuary for birds. Many birds were seen there, including a pair of Rufous Whistlers taking turn about on the nest, and it was a great thrill to see the Diamond Firetail feeding on the ground. On the farm were several very large Black Boys (*Xanthorrhoea australis*). We were escorted to a quarry nearby which supplied stone (Altered Granite) for the construction of the Anglican and Roman Catholic Cathedrals in Wangaratta.

The next day saw the party return to Beechworth, this time to see places of historical interest, including the Powder

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Magazine and Museum, where much of the early history is preserved. The next day, Sunday, saw us homeward bound, driving along the King River Valley to the Tolmie Ranges where the party stopped at Power's Look-out. Here members would have liked more time to enjoy the *Calytrix tetragona,* which was seen in flower. *Dodonea cuneata* or Hop Bush was there, also *Dipodium punctatum,* the Hyacinth Orchid, and *Isotoma exillaris* or Rock Isotome was also in flower.

Our last stop was for lunch at the back-waters of Eildon.

At the showing of the last slide, which was a large dead tree by the lake side, the guest speaker said this may serve to remind us of our responsibility to plan carefully, and preserve our natural heritage for future generations.

The President thanked Miss Forster for an excellent presentation.

Exhibits from Excursion to Wangaratta.

Beechworth Granite—Many buildings built of it.

Conglomerate—Powers Lookout.

Altered Granite—Warby Ranges. Colouring due to decomposition of Felspar and pyrites.

Mica Schist from Metamorphic Belt in area covered during

Ironstone Concretions (mainly limonite-hydrated iron ore, found on pans at Andamooka, S.A. (Opal field).

Worlds tallest rush—*Juncus ingneus*: Giant rush from Narracan. 9' 3" long and recorded up to 15 ft. J. Morrison.

Natural History Medallion on exhibition.

Mrs. Salau—*Molybdenite,* Mt. Everton. *Granite,* Pilot Range near Beechworth. Cordierite Schist.

P. Kelly—Toadstools with another species of fungi growing parasitic on it.

Botany Group Report—8 June, 1967

On Sunday, 28th May, twelve members made an excursion to Mt. Martha and Moorooduc. The native plant reserve was visited, where there was a good collection of trees and shrubs, and the surrounding countryside provided many plants to identify; among them being the Snow Gum *Euc. pauciflora.*

At our last meeting Miss Lester took the chair in the absence of Mr. Fuhrer.

Miss Helen Aston was our speaker, and her subject was "How the Plant Taxonomist Works". She explained that taxonomy had two main branches—classification and nomenclature.

Classification is the study of plants, herbarium specimens, and live specimens, with the aim of placing them in groups according to their natural relationships. (Taxon is a general term for any natural group of any size—species, genus, family, or even larger group.) Botanists are continually examining and revising the existing classification in order to achieve a better organisation that is more readily understood, and based on the evolutionary history of the plants. Many factors must be taken into account, and as more information becomes available, such revision is likely to continue ad-infinitum. Nothing can be fixed and permanent.

Miss Aston showed us the published results of several botanists' studies on various taxons.

As an example of what she called "accidental" taxonomy, Miss Aston spoke of how her curiosity was aroused regarding the genus *Villarsia* of which, as yet, there is one one species listed for Victoria. There followed field work throughout the State, many hours at the desk examining other *Villarsia* species, descriptions, and writing to herbariums. As a result, in the future there may be two *Villarsia* species listed for Victoria, plus a variety of one of them.

Miss Aston stressed that, in the classification of plants, much depends on the judgement of the taxonomist. No such judgement is required in nomenclature. The naming of plants *must* follow the International Rules of Botanic Nomenclature. These rules are mainly concerned with the type concept and priority of names.

Finally, the taxonomist must make his results known—by publication, and by distribution of representative specimens of the taxon he has been studying.

Miss Lester asked for a vote of thanks to Miss Aston for her most interesting and informative talk.

Marine Biology and Entomology Group Meeting—1st May, 1967

Twenty members attended this meeting, which was chaired by Mr. R. Condron.

Mr. Condron opened the meeting by expressing great regret at the passing of the former Secretary of the F.N.C.V., Mr. Eustace Coghill. Mr. Coghill was a regular attender at our group meetings, and seldom came along without bringing an interesting exhibit. The Group stood for a short time in silent tribute.

Mr. McInnes announced that the first

meeting of the F.N.C.V. Show Committee had been held, but that no specific space had been allotted to this Group. Discussion took place re exhibits, and as there are many difficulties connected with a live marine exhibition, it was decided that the Group would not have one this year. We hope to stage a freshwater exhibit.

The Secretary announced that the Club Secretary, Mr. David Lee, had contacted him to say that the Fisheries and Wildlife Department were conducting a fact finding survey on the giant earth worm, to establish its present status and distribution. They asked for any assistance that we might be able to give them. After discussion, it was suggested that the secretary contact some of the Gippsland Nature Clubs who may be able to help.

Miss White stated that Mrs. Crane, of the Yallourn Nature Club, is banding Wanderer Butterflies, and suggested that Mr. Condron might like to contact her.

Mr. Condron then introduced our guest speaker, Dr. D. J. Griffiths, Senior Lecturer, School of Biological Sciences, La Trobe University. His subject being "Algae". Dr. Griffiths described different types of these, and gave the Group a very interesting talk on the controlled experiments which were carried out on them in the laboratory, giving details of how they are grown. He told us what could be learnt from these experiments. At the conclusion of his talk, Dr. Griffiths was asked many questions, and a vote of thanks was moved by Mr. Condron.

Exhibits

Mr. Strong showed portion of a butterfly's wing under low microscopic power, and explained how this had been soaked in xylol for 3 hours and then wet mounted, making it translucent, and enabling the scales to be seen "in situ" with normal bottom lighting.

Mr. Condron showed a moth of the family Geometridae, and explained that the larvae of this family were the well-known looper caterpillars.

Microscopical Group Meeting 19 April, 1967

Twenty members and visitors attended the meeting, visitors were Mrs. Flemming and son, Miss Mary Morgan, and Peter Rankin. Mr. J. Dawes was chairman.

The minutes were read and confirmed. Mr. J. Dawes informed the group that Mr. Meyer had expressed his willingness to fill the vacancy of secretary. He moved a motion on this matter, seconded Mr. W. Genery, and the motion was carried unanimously.

Mr. J. Strong moved a motion expressing appreciation of what Mr. P. Genery had done for the group over the six years in which he has been secretary, and he also suggested that this motion be recorded in the minutes. This was seconded by Mr. W. C. Woollard and was carried unanimously.

Mr. McInnes reported that 10 members and their friends attended the excursion to Tanti Creek at Mornington. It was a great success, as almost every type of pond life was collected: amoeba, desmids, volvox, rotatoria, protozoans and aquatic insect larvae.

Mr. W. Genery complained about the editor's treatment of his article on *Lepidurus*, submitted last August, and which had been mislaid. He read out to all present the article, which was a very descriptive picture of this interesting crustacae, which he has been observing for some years. Finally he handed over his own copy to replace the lost original.

Mr. W. C. Woollard displayed under a club microscope a radula of the limpet (made by Mr. J. Strong).

Carl Meyer exhibited the transverse stained section of *Laurus nobilis*.

Mr. C. Nance displayed one of his usual excellently stained plant sections.

Mr. W. Genery displayed some volvox globata along with daughter cells.

Mr. K. Trotter showed a slide of arranged silico flagellates and demonstrated by means of a model the third dimensional arrangement of the frame of this fossil protozoan *Dicopta gracilis*. His young friend Paul demonstrated a slide made by Mr. Trotter of an excellent arrangement of butterfly scales.

Mr. J. Strong exhibited some marine protozoans, Mr. J. Dawes a section of a plant.

Mr. D. McInnes demonstrated a rather unique way in which the attraction that light has for many forms of pond life, is exploited, in order to localize in one place many of the infusorians in a small dish of water.

Mr. P. Genery demonstrated a very lively specimen of female tardigrada with its eggs.

[The editor thanks Mr. W. Genery for his past contributions, and has the deepest regard for his fine work in the field of microscopy.

It is regretted that the temporary misplacement of the mentioned article has caused some displeasure.]

F.N.C.V. DIARY OF COMING EVENTS

GENERAL MEETINGS

Monday, 10 July—At National Herbarium, The Domain, South Yarra; commencing at 8 p.m.

1. Minutes, Reports, Announcements. 2. Correspondence.
3. Subject for the evening: Presentation of Natural History Medallion, and Lecture on "Conservation—For Whom by Whom"—J. Ros Garnet.
4. Election of New Members and Subscribers.

   (a) *Ordinary:*
   Mr. W. Morris, 53 Barkers Road, Kew. (Interests—General.)
   (b) *Country:*
   Mr. Robert John O'Neill, Delancey Road, Wandin North, Vic. (Interest—Botany.)
   (c) *Subscriber:*
   The University of Adelaide, Barr Smith Library, Adelaide, S.A.
   The Librarian, Goteborgs Universitetsbibliotek, Botaniska sektionen, Botaniska tradgarden, Goteborg, SV, Sweden.

5. General Business.
6. Nature Notes and Exhibits.

Monday, 14 August—"Victorian Mountains"—Rodger Riordon.

GROUP MEETINGS

(8 p.m. at National Herbarium unless otherwise stated)

Thursday, 13 July—Botany Group. Mr. J. H. Willis will speak on Flower Perfumes.

Wednesday, 19 July—Microscopical Group.

Friday, 28 July—Hawthorn Junior F.N.C. meet at 8 p.m. at the Hawthorn Town Hall.

Wednesday, 2 August—Geology Group.

Thursday, 3 August—Mammal Survey Group. This group meets in the library of the Fisheries and Wildlife Dept., Flinders Street Extn., at 7.45 p.m.

Friday, 4 August—Preston Junior F.N.C. meeting in the Rechabite Hall, 251 High Street, Preston (north from Bell Street), at 8 p.m.

Monday, 7 August—Marine Biology and Entomology Group. This group meets in Mr. Strong's rooms at Parliament House at 8 p.m. Enter through private gate at south end of building.

Thursday, 10 August—Botany Group.

F.N.C.V. EXCURSIONS

Sunday, 9 July—Botany Group Excursion to Altona. Meet at Batman Avenue at 9.30 a.m. Private transport.

Sunday, 16 July—There will be a morning visit to the Natural Resources Nursery at Springvale. The afternoon will probably be spent at the Ferntree Gully National Park, but this is open to alteration. The coach will leave Batman Avenue at 9.30 a.m. Fare $1.40. Bring one meal. Bookings with Excursion Secretary.

Thursday, 31 August, to Sunday, 10 September—Broken Hill. The party will leave Melbourne on 31st August, stay overnight at Mildura, and reach Broken Hill on Friday, 1st September, remaining there for a week with day trips in conjunction with the Barrier F.N.C., including Mootwingee, Purnamoota field, Silverton, Umberumberka Reservoir, local mines, etc. An extra day will be taken on the return trip with overnight stops at Mildura and Swan Hill. The cost will depend upon the number going but should not exceed $100 (lunches excepted). Bookings should be accompanied by $10 deposit, the balance to be paid by the end of July, please check for vacancies before sending deposit. All cheques should be made out to Excursion Trust.

26 December, to 1 January—Portland; Details will be given in future issues.

Field Naturalists Club of Victoria

Established 1880

OBJECTS: To stimulate interest in natural history and to preserve and protect Australian fauna and flora.

Patron: His Excellency Major-General Sir Rohan Delacombe, K.B.E., C.B., D.S.O.

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Hon. Excursion Secretary: Miss M. Allender, 19 Hawthorn Avenue, Caulfield, 3162.

Hon. Sales Officer: Mr. E. R. Allan, c/o National Herbarium, The Domain, South Yarra, 3141.

Group Secretaries:

Botany: Mrs. P. E. Matches, Flat 3, 33 Abercrombie Street, Balwyn (80 3651).

Geology: Mr. R. Box, 19 Fulham Grove, Reservoir (47 5393).

Microscopical: Mr. P. Genery, 42 Barnard Grove, Kew (86 5851).

Fauna Survey: Mrs. R. Frankenberg, 36 Percy Street, Balwyn.

Entomology and Marine Biology: Mr. J. W. H. Strong, Legislative Council, Parliament House, Melbourne, 3002.

MEMBERSHIP

Membership of the F.N.C.V. is open to any person interested in natural history. The *Victorian Naturalist* is distributed free to all members, the club's reference and lending library is available, and other activities are indicated in reports set out in the several preceding pages of this magazine.

Rates for January-December 1967 are:

Ordinary Membership	$5.00
Country Membership (over 20 miles from G.P.O., Melbourne)	$4.00
Junior Membership (under 18 years)	$2.50
Subscription to the *Victorian Naturalist* (non-members)	$4.00

All subscriptions should be made payable to the Field Naturalists Club of Victoria and posted to Mr. R. L. Smith, 430 Little Collins Street, Melbourne, 3000.

Note: The currency of the present club year and Volume 84 of the *Victorian Naturalist* is from January to December, 1967.

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FIELD NATURALISTS CLUB OF VICTORIA

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The 1967 Wildflower and Nature Show

The Show will be held in the Lower Melbourne Town Hall on Monday, Tuesday and Wednesday, 28, 29 and 30 August respectively, and will be open from 10 a.m. to 10 p.m. daily. It will be prepared and staged by the Society for Growing Australian Plants, and by the Field Naturalists Club of Victoria.

The Patron of the F.N.C.V., the Governor of Victoria, Sir Rohan Delacombe, and Lady Delacombe, will visit the Show on Monday, 28th August, at 3 p.m.

Our native plants have a special charm of their own and the many successful enthusiasts in the S.G.A.P. will stage a very colourful display of many varieties from all Australian states, grown in their own home gardens. There will also be a special display from the Maranoa Gardens, Balwyn. As the growing of native plants is becoming increasingly popular, this exhibit will be of special interest to many would-be growers, and an Information Centre will be set up to answer any queries about the growing and availability of native plants.

The F.N.C.V. display will cover a wide variety of natural history subjects. This year the central exhibit will feature a glow-worm cave, complete with stalactites, stalagmites, rock pillars, a pool, and illuminated shawls. When darkened, hundreds of glow-worms may be seen "glowing" around the roof of the cave.

The "Vegetation of the Foreshore" will be the theme of the botanical exhibit, while the geological exhibit will feature "Some of the Important Ore Deposits of Australia". Entomology will be represented by live aquatic insects, and marine life by that to be found around Beaumaris. Spiders, always a centre of interest, will be shown, both alive and mounted in plastic. This latter feature should be of special interest to many entomologists. Under a number of microscopes may be seen both the beauty and normally hidden detail of the minute world. One may examine rock sections in colour, and microscopic pond life will be shown with a micro-projector.

The Hawthorn Junior Field Naturalists will stage a great variety of exhibits, some alive, some working, and some just to examine. There will be live tortoises, lizards and snakes—in glass cases!

As well as a display of gemstones, they will have a working exhibit, showing the grinding and polishing of the gems. Another working exhibit will show how to cut, mount and stain plant sections for microscopical examination. There will be a display of animal skulls and some individual nature projects by junior members. On view will be books and pamphlets produced by this group.

And last, but by no means least, the National Film Centre has made available a selection of films on wild-life, mostly coloured, which will be shown free, at frequent intervals.

Books and journals dealing with natural history subjects may be purchased at a Publications stand, where information relevant to the F.N.C.V. may also be obtained.

(*Continued on page 238*)

The

Victorian Naturalist

Editor: G. M. Ward
Assistant Editor: W. White

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Front Cover:

From the Lower Cretaceous beds of S.-E. Gippsland comes the fossil Lacewing larva shown in the photograph.

The photograph was taken by Peter Handby of Morwell.

Prothalamion in a Garden Pond

By Densey Clyne

His legs dangling, the big striped frog floats upright at the edge of my garden pond. The bubble of his inflated throat supports him like a life-jacket. One hand rests on a floating leaf, the other against the sandstone wall. Blank eyes protrude skyward, reflecting twin moons.

"Toc!" The call is explosive, and the fractional recoil of his body rings the water around the frog with ripples. Toc! . . . . toc! . . . . toc! He keeps his mouth closed and his throat remains inflated between calls.

Around the pond a dozen or more of his kind are calling from the water; single notes, distinctively pitched according to the age and size of the caller, following each other to produce a simple, random tune. Floating in positions they have reserved for the night, the frogs are clearly visible, like so many ping-pong balls. They are males of a common Australian species, *Lymnodynastes peroni*, making their whereabouts known to the females.

Some feet from the frog I am watching, and at right angles to him, a female has been resting for some time. Submerged like a miniature hippopotamus, with only eyes and nostrils above water, she gazes with seeming indifference at the wall in front of her. Suddenly she darts towards the male and comes to rest six inches away from, and with her back to him.

Immediately the quality of his call changes. Up to now he has been taking part in a carefully spaced call sequence in which notes are transposed now and then, like bellringers ringing the changes. Some of the frogs pair off vocally and make their call simultaneously, perhaps to allow a clear pause between each unit of sound. The pond is crowded, and a blur of notes might confuse the females.

Male *Lymnodynastes peroni* with vocal sac extended.
Drawn by Author

This frog now drops out of the chorus to concentrate on the female who has picked him out of the line-up.

He reduces volume, metaphorically kicking aside the biological metronome that has been regulating his strict call-pause ratio.

His note becomes a gentle entreaty, a come-hither to which the female bats no obvious eyelid. . . .

Another frog surfaces at the female's side with a swirl of water; she hurries off, alarmed. The intruder adopts an upright stance near the male, inflates his throat and calls loudly. The first male deflates his throat, swings round, and now floating with his legs spread close to the surface, he challenges the usurper with a hoarse groan.

The stranger groans in turn. He attacks, and the two males wrestle together in slippery combat, thrusting shoulder against shoulder, chasing about under the overhanging rocks to emerge and press throat to throat, chin to chin, with snouts pointing skyward and limbs ineffectually grappling for a hold. Now they pause, gazing over each other's shoulders as though indifferent; now they break away to resume the rough and tumble, groaning and clucking the while.

For half an hour or more they argue, then down they suddenly dive in a chase through the deep water, legs thrust out behind to their full extent, giving them quite a turn of speed. The female, still in the vicinity, goes on staring at the wall. . . .

One of the males surfaces. In a flash he is back in position, almost throwing himself over backwards as he inflates his throat and resumes the earlier rhythmic calling. He is the original territory-holder, identifiable by a graze on his head. He appears unharmed by his fight, and the call of his rival can be heard from a safe distance.

The female is suddenly back at her male's side. Enough of this love-talk, she means business and wastes no more time. Sharply she nudges the male in the shoulder with her snout, and turns to lie alongside him, pressed against his flank.

He is clucking quietly now, and in a series of gentle manoeuvres moves behind and above her, his throat resting on her head, his arms clasping her tightly in front of the flexed legs. . . .

Barely audible behind the racketing concert is a different kind of sound; a faint rhythmic splashing that comes from the far side of the pond where a mass of white froth floats against the dark sandstone coping.

At one end of this mass, two dark heads can be seen, the smaller on the

A mating pair of *L. peroni* in amplexus. The foam containing the eggs is whipped up by the female, and finally almost envelopes the frogs.

Drawn by Author.

surface of the water, the other above and behind it. This is another pair of frogs which has been in amplexus for some time. In front of both snouts is a cluster of tiny bubbles; a chain of them extending back around the jaw of the male, to join up the gelatinous froth that partly envelopes them posteriorly, a froth speckled with black eggs.

The splashing sound comes from the female. She is beating the water with her hands, never breaking the surface, but producing a rhythmic "slop-slop-slop-slop". She uses each hand alternately, thrusting outward and downward and pausing between each set of four beats. Her head reacts with a slight dodging motion. After every fourth beat the male moves forward a little and then uses his hind legs to regain his position.

The female is laying spawn which is fertilized by the male, and at the same time releasing a substance capable of being whipped to a froth. Her movements beat this substance into a gelatinous mass which will surround and protect the eggs.

For two hours this mating pair has been in position. Every minute the female completes nineteen sets of four movements. In two hours, at this rate, she has made 9,120 separate movements with her hands. Perhaps she looks a little desperate!

The egg-mass would be somewhat larger by now if it were not already nourishing some other pond dwellers. A smacking sound comes from beneath it, and red bodies flash intermittently as the golden carp suck in their supper between pouting lips. By morning there will be little spawn left; by tomorrow evening, love's labour will be entirely lost.

A tattered "waterlily leaf" lying just below the surface comes suddenly to life; and six inches from it, what appears to be a half-submerged, shiny, brown lily bud, blinks open golden-ringed eyes, that are set behind gaping nostrils. The golden rings glance about intently. Now the head is withdrawn and moves slowly forward below the surface, dragging behind it on the end of a long neck what had seemed to be an old lily-pad.

All through the summer the tortoise *Chelodina longicollis* has basked in the sun close to the surface; his carapace carries a growth of green algae so long that it trails behind him as he swims. Only at night does he break his perfect camouflage to quarter the pond, revealing himself as an agile and ruthless predator.

Now, neck stretched to its full extent and head questing, he paddles slowly around the pond. Unmated male frogs are still calling, and close to one the tortoise stops. Does he see with those continually glancing eyes, or is the scent carried through the water to his pitlike nostrils?

He points like a dog, then moves forward, hardly stirring the fallen leaves that float above him or the stems of water weed through which he manoeuvres. His head stops a few inches from the frog, but his body continues its forward movement until the long neck is bent sideways in a flattened loop. The frog still calls, but a little uncertainly.

In a flash, the tortoise uncoils its neck to the fullest to lunge at the frog from below. He misses. The frog has shot from the water as though squeezed, and crouches on a lily-pad, deflated throat pulsing rapidly. The tortoise noses around a little, butting his snout hard against the rock wall where the frog has been, then goes on his way.

He reaches the spawning pair and stops, casting about with his head to pinpoint their position. The frogs are intent and unaware, the female's egg-beating movements continue unabated.

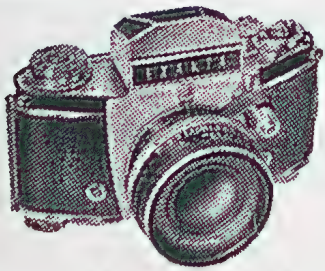
The male is barely visible now under the rising mass of foam.

The tortoise moves in for the strike, drawing his body close to his purposefully curving neck . . . still the little female doggedly beats the water, the clasping male gazes straight ahead . . . and with a flurry of foam and water the snapping jaws have secured their prey. The female, hampered by the male, has been seized from behind. Oddly submissive, perhaps paralyzed, arms and legs extended, she is borne to the bottom of the pond in a steep dive, her white belly and throat shining clearly up through the water in the grip of the snakelike head.

At once he starts a violent flailing movement with his long neck, swinging his head from side to side. His prey is brought close to the front of his carapace at the end of each swing, and held there for a moment by the powerful extended claws of the front leg, while the head jerks into its opposite swing.

The frog is too big to swallow in one piece. The tortoise is using its jaws and claws and the powerful whiplash of its neck in an effort to rip the body into manageable portions. Now, still lashing and tearing, he has moved to the deep end of the pond to finish the job hidden by the murky water.

The male frog has disappeared. The goldfish, disturbed at their feast, have moved across the pond to where foam is gathering behind the newly mated frogs. Already they hang beneath it, quivering, red-gold, smacking their lips and doing their share towards preserving the *status quo* within the natural world.



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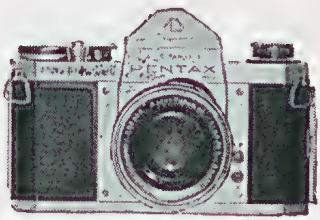

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Readers' Nature Notes and Queries

These columns are available for all members, young and old, to bring before others their own observations in nature. Correspondence may be sent to the Editor, 54 St. James Road, Heidelberg.

The Editor's file of Nature Notes is still very thin; please endeavour to refill it as soon as possible. Everyone, including the Junior Members is encouraged to contribute.

Leaf-curling Spiders

These interesting notes and observations come from Mr. W. Perry of Eaglehawk, near Bendigo in Victoria.

To many readers, the Leaf-curling Spider (*Phonognatha wagneri*) is well known. An orb web, usually close to the ground, and to which is attached the curled-leaf shelter of this interesting spider, is easily identified. In the Whipstick Scrub, these leaf-adorned webs may be seen during February and March.

Sometimes the leaves are curled spirally, bound with silken threads, and attached to the webs where they hang like inverted, irregular hollow cones. The presence of an occupant is indicated by the tips of several legs protruding from the lower end.

One day, by tossing small pieces of match into a web, where they clung to the viscid threads; a spider was enticed from her lair. Several times the spider rushed out, inspected the piece of match, and returned to her shelter. She always returned quickly, and once safely inside, the web would shake violently as she turned around. She would immediately return to the usual position with tips of legs protruding. Poised in this way, *Phonognatha* was alert and ready to pounce on any unfortunate victim that blundered into her web.

A web of *Phonognatha wagneri* with two curled leaves was observed at Reed's Lookout, Mt. Victory, Grampians, on March 17th, 1967. Attached to a low shrub, the web was sheltered by huge rocks from the strong winds which seem constantly to whip up from the valley below.

Each curled leaf was from a eucalypt, but one was much smaller than the other. In the larger leaf was a female spider. The smaller leaf was occupied by a male.

Although I have often seen female spiders of this species, this was my first observation of a male.

These creatures were not without beauty. The cephalothorax and legs of the female were light brown, and the dorsal surface of her abdomen was of a darker brown, irregularly patterned with black markings along the sides. Her body length (cephalothorax and abdomen) was 7 mm. The legs and cephalothorax of the male were also light brown, while the dorsal coloring of the abdomen was the same; but with a longitudinal orange mark down the centre, flanked by patterns of dark brown. The male measured 3.5 mm., only half the length of the female.

Silver Gull Behavior

Christina Rodger of Mont Albert in Victoria, fulfills both categories of these columns by sending some interesting observations with a question.

Is it the habit of seagulls to take possession of a territory some distance inland? On a visit to Wilson's Promontory in February we found ourselves adopted by two young seagulls (adult grey feathers but still bulky, not slim and streamlined like their elders). I expect it was our cottage they owned, not the humans, but they stayed with us and certainly regarded any food we offered as their perquisites. They were most belligerent when other gulls came to share, even to the point of missing the food while they tried to drive off the others, rushing at them with necks stretched and arched and beak wide to squawk. Numbers did not daunt them; they would dash furiously about in the crowd, untouched, as far as we could tell, by gulls or the magpies that came occasionally. A small wattle bird would stand to defy them: there would be much noise but no fight. They did keep their distance from the parrots, though they would come round my feet, protesting, if a parrot settled on my arm to be fed. At any time they were faithfully in attendance—early risers found at least one beak raised

hopefully at the dorstep and, when we came back from excursions, they appeared, generally from the roof, before the car had stopped. That small area seemed to be their home—is that usual?

When referring to the "seagull" in your notes, I am assuming that it was the Silver Gull; and if this is so, then it is quite common to find them well inland. This fact is well illustrated in *A Handlist of the Birds of Victoria* by Roy Wheeler, where it may be seen to occur over the whole of the State with the exception of the western border of the Mallee, and the lower section of the north-eastern part of Victoria.

Within a flock of gulls, there is quite often a more pugnacious member which tends to rule over the others. It appears that two gulls with these tendencies were adopted by you.

Egg-case of Mantis

This most interesting and keen observation of one of the wonders of nature within our gardens, was sent by Mr. Alfred G. Fellows of Alabama Hill, Charters Towers, Nth. Queensland.

In passing a young Guava tree to see if it needed watering, something pale blue caught my eye, which, on closer inspection, proved to be the egg-case of a mantis in process of construction on a twig of the tree.

The twig hung downward, as the mantis — also upside down — slowly moved her abdomen tip in a slow spiral motion, gradually adding the frothy semi-liquid material with a kneading movement, the limitation of her organ's travel being decided by two appendages situated not far from the abdominal extremity.

After each "circuit" of the egg-case a brief pause occurred—no doubt an egg was being placed. After constant watching for a quarter of an hour, the egg-case, which was about one inch in diameter, was only one quarter of an inch longer.

As I moved blades of grass away to prepare for some photographs, the insect's head followed my movements as only a mantis can do, but the case-making went on just the same.

Four good stereoscopic natural colour photos resulted, but when half an hour later I passed that way, the case was a little longer (about one and a half inches), roughly sealed off, and the mantis gone. Two hours after the case was completed, the pale blue had changed to greyish shades. Next day, it was a shiny straw colour.

That was two months ago. Each day I pass it to see if and when the young mantis will emerge.

Notice for Group Secretaries

The Editor will be away during September, therefore could all reports and correspondence for the September and October issues of the *Vict. Nat.* be sent to Mr. W. White, 24 Eden Street, Cheltenham.

Wanted

One of our younger members requires any unwanted copies of *Vict. Nat.* **80**, 6 (October, 1963). If anyone is able to help, please contact Gordon Temby, Box 327, Hamilton, 3300.

Natural History Medallion Recipient for 1966 — J. Ros Garnet

J. ROS GARNET has had a remarkably long association with the F.N.C.V., of which he has been honorary secretary, on every committee, and a vice-president and president, showing great enthusiasm in all offices.

His interest in natural history and in the furtherance of National Parks is well known.

Since 1946 he has been concerned with the development of National Parks, and has been secretary of the National Parks Association for over 20 years. He has conducted deputations to ministers of the Government to discuss conservation, and has done much to promote public interest in broadcasts, and articles in magazines and newspapers.

The National Parks Association Newsletter has often been prepared by him, and circulated widely, including to every member of Parliament.

In 1950 he became a member of the Committee of Management of Wyperfeld National Park, and has published a booklet (illustrated by himself) on the vegetation of Wyperfeld.

He has also written a chronological and natural history of Wilson's Promontory, the first part of which concerning the flora, is being published. He has also contributed scientific papers about his own scientific work in biochemistry and microbiology with the Commonwealth Serum Laboratory, and he wrote a booklet to celebrate fifty years of the C.S.L. for the information of the medical profession.

The Wimmera F.N.C. knows him well for his work on National Parks and Sanctuaries.

The award to Mr. Garnet was well deserved and has been acclaimed generally.

On receiving the medallion, Mr. Garnet said he was abashed by all the things said about him, and felt deeply indebted to all associated with him. What had been done could only have been possible with the support of people of the same turn of mind.

(*Continued from page 230*)

At the August General Meeting of the F.N.C.V. rosters for helpers at the Show will be distributed. To ensure its success it is hoped that as many members as possible will fill in as many hours as possible. Members are especially asked to attend on Sunday, the 27th, to help in the setting up of the Show. We start at 9 a.m. New members are invited to take an active part, both during the Show and in the setting-up.

Also at the General Meeting, leaflets, window cards, and car stickers will be available for distribution. With your help we would like every school in the city and suburbs to receive a bundle of pamphlets and a Show card. Please make our Show as widely known as possible. The admission fee will be 10 cents for children and 25 cents for adults.

First Footing on a Bass Strait Island: an Investigation of Dover Island in the Kent Group

By J. H. MULLETT and
S. MURRAY-SMITH

Draw a line between the tip of Wilsons Promontory and the northern end of Flinders Island, bisect it, and you should hit a point in close proximity to the Kent Group: three major and two minor islands which, despite some rude remarks passed about them by earlier explorers, are perhaps the grandest in natural scenery of all the 126 islands and islets which sprinkle Bass Strait. Nor are they contemptible in size. Viewed from a distance the whole group stands up out of the sea like a scaled-down, but only slightly scaled-down, Wilsons Promontory.

Deal Island, the major island of the Group, is nearly four miles long in a north-south direction, and not much less east-west. It rises to nearly one thousand feet, with spectacular granite cliffs and a number of delightful secluded coves. It boasts, virtually on its highest point, what is stated to be the most elevated lighthouse in the southern hemisphere; and two lighthouse keepers and their families live permanently on the island.*

* The expedition is deeply indebted to these kind folk, Mr. and Mrs. Kevin Underwood and Mr. and Mrs. John Duncan. We also wish to acknowledge with gratitude the help and co-operation of Captain H. M. Head and Mr. C. R. S. Conway, of the Department of Shipping and Transport; of Mr. Frank Goold, of Port Albert; and of Mr. Bob Crouch, of Motor Spares Ltd., who provided the party with an efficient outboard motor without which our explorations of Dover Island would have been impossible. We also owe a large debt to Mr. and Mrs. Jack Lierich of Port Welshpool. Tongala Milk Products supplied the party with some excellent canned whole-milk.

To the west of Deal Island, and separated by the strong tidal waters of Murray Pass, lie its companion islands of Erith and Dover. Erith, the base of our party's activities, is about one and a half miles across at its widest points in each direction. It is joined to Dover Island by a narrow neck of land, covered at high water, which is known as the "swashway".

Both Deal and Erith Islands have been extensively grazed, and their flora and fauna has been subject to much human interference. (The Kent Group has been continuously occupied since the building of the lighthouse in 1847—one of the first lights ever to be built through intercolonial co-operation.) Dover Island, however, is distinguished as being one of the very few Bass Strait islands of any size which remain virtually untouched by the hand of man. It is a rugged "hog's back" of an island, the spine of which runs approximately two miles in a north-east to south-west direction. There are no sandy coves on which to run up a boat, and for much of its circumference it is well guarded by cliffs and crags which culminate in the imposing and somewhat awe-inspiring cliffs which rise to some six or seven hundred feet at its southern end. West Bluff is the name on the charts, but the fishermen refer to this great precipice as "Mother-in-Law's Leap".

This geographical description of the Kent Group is completed by remarking on the presence of two off-lying islands: South-West and North-East. Mutton-birds and Cape Barren geese may occasionally be found breeding on North-East, the only place so far as is known in the Group where they are found. The other islands however have quite a varied bird life, including oyster catchers and sea eagles. Penguins are numerous and, on Erith Island at least, a positive nuisance to the camper, sharing his meals, his tent and even his bed.*

The Kent Group in our History

The Kent Group was first sighted by Matthew Flinders from the schooner *Francis* in February 1798, on the third and last trip to Preservation Island, south of Cape Barren Island, to rescue the survivors of the *Sydney Cove*. It was the foundering of the *Sydney Cove* (out of Calcutta for Port Jackson) in February 1797 that indirectly led to the opening up of Bass Strait as the great maritime highway of the Australian colonies. (Governor Hunter named the Group after the indefatigable Captain William Kent, commander of the famous *Supply*. Subsequently, by a geographical pun, the three largest islands were named after towns in Kent.) A few months later, in September 1798, Bass and Flinders were given command of the *Norfolk* sloop to demonstrate the insularity of Van Diemen's Land. In company with the *Nautilus* snow (which was to prospect the seal fisheries in Bass Strait), the *Norfolk* sailed through Murray Passage, the first ships to pass straight through the centre of the Group; and they found, as we found, the treacherous nature of wind and tide in these peculiar topographical circumstances: "We entered the channel with a fresh breeze, but were soon becalmed under the land, when in a moment a gust laid the gunwale so far under water that the *Nautilus* expected to go to Furneaux's [Flinders] Island by herself".[1]

For a little while the Kent Group was quite important. The authorities in Sydney were looking for a safe harbor in Bass Strait waters, and there are two coves off Murray Passage which to this day offer good anchorage, between them, in most weathers. But the discovery of Port Phillip within a few years overshadowed this, and the Kent Group receded to become a hideout for pirates and sealers and escaped convicts, "bolters" in the parlance of the day. In 1831, for instance, George Augustus Robinson, well known for his role in persuading the remnants of the Tasmanian Aborigines to accept deportation to Flinders Island, discovered a number of sealers and absconding convicts, together with their Tasmanian women, in occupation at Garden Cove on Deal Island.[2]

But with the killing out of the seals of Bass Strait the Kent Group, as with the other islands, would have lost what little significance it had without the decision by the governments of the colonies of New South Wales and Van Diemen's Land in the 1840s[3] that something would have to be done to halt the terrible toll being taken by the Bass Strait islands of the new immigrant traffic to Australia. Even today, it is startling to reflect, our greatest civil

* Names marked with an asterisk in the accompanying map are names which were proposed (on historical grounds) by the expedition to the Tasmanian Nomenclature Board, and which have been accepted by that Board. Mount Mullett, above the Swashway, was the site on which Mr. Jack Mullett established his advance camp. It was gazetted Mount Mullett by the Nomenclature Board after Mr. Mullett's death, as a tribute to his exploratory scientific work on Dover Island. It is referred to as Mount Mullett in this article, although of course not known to the expedition or to J. H. Mullett as such.

Panorama of Dover Island from the north, taken from Erith Island. The Swashway is off the picture to the left.

Photo: S. Murray Smith

disaster as a nation dates back to the wreck of the *Cataraqui* on King Island in 1845, with the loss of over four hundred souls. During 1846 and 1847 the Deal Island lighthouse was built, with the help of bullock teams to pull the timber and quarried stone up the precipitous pinches to the commanding eminence selected for the tower. At a lower level, above the landing cove on Deal Island, still stands a fine old house dating from the mid-years of the century, a home which housed the head keeper and his family for a century, which was the scene of "missionary" services held by such divines as Bishop Nixon and Canon Brownrigg (their hazardous voyages to the Kent Group are chronicled in their books[4]), and which today stands in urgent need of preservation by the National Trust as a unique building of its kind.

Scientifically the Kent Group has aroused interest from its earliest days. Its sea-girt position, its strategic position mid-way in the line of islands which mark the old isthmus which linked the mainland with Tasmania, make it of special interest to botanists, palaeologists and zoologists, and today scientists, from Monash University in particular, are conducting spasmodic work there. In Australian botanical history it has been a classic collecting ground for marine algae as well as for land plants. The great Robert Brown, Matthew Flinders' botanist on the *Investigator*, of whom Sir Joseph Hooker said that his discoveries amounted to more than the sum total of all previous botanical discoveries on voyages of exploration, hitched rides to the Kent Group with sealers, about 1803, and some of his Australian type specimens (e.g. Boobyalla) emanate from the Group.[5] Brown's colleague, the botanist George Caley, made it his business to visit the Group in 1806.[6]

The first and only major scientific expedition to the Group was, however, that of the Victorian Field Naturalists' Club in 1890, and thus this present report, though formally dealing with Tasmanian territory, is fittingly presented in the *Victorian Naturalist*. The 1890 expedition camped in Garden Cove on Deal Island, and paid only fleeting visits to the other islands, not visiting Dover Island at all. Its report, however, is a document of major interest.[7] A party with scientific interests, including (Sir) James W. Barrett, visited the Group in 1909, but made only superficial observations.[8]

In 1958 Mr. Colin A. Garreau, a light-keeper who took a pronounced interest in the natural history of the Kent Group, contributed an article to this magazine on his investigations. Like others, he was daunted by the difficulties of Dover Island.[9]

Dover Island

During the summer of 1962-63 a small group, of whom we were members, spent about two weeks on Erith Island, making a general investigation of the locality and undertaking some minor scientific work, especially concerning the collection of mosquito specimens for Dr. N. V. Dobrotworsky of the University of Melbourne. During this visit it became clear to us that the most interesting challenge the Group afforded lay with Dover Island. It appeared to us, as it still does, to be ecologically basically undisturbed; it has never been the venue of habitation, of grazing or even, to any extent, of penetration. Further, it appears not to have been burnt, at any rate in recent times. The island was briefly visited, but with the resources at our disposal, and the time, it was impossible to proceed further.

During 1966, however, we discussed this problem further, and decided to return to our base camp on Erith Island in order to carry out an investigation of Dover Island so far as this was practical in the time (some three weeks) at our disposal. We received every encouragement from Professor J. S. Turner of the University of Melbourne and from Mr. J. H. Willis of the Royal Botanic Gardens and National Herbarium. Mr. Willis wrote, regarding Dover Island: "it's a miracle that no fisherman, of vandal tendency, has yet succeeded in setting fire to the dense shrubberies there, which may well hold botanical treasures. . . it does seem that no one has done any botanizing on Dover since the time of Brown, just 163 years ago." (Brown collected only two specimens from Dover Island.) Equipped with collecting equipment for higher plants and lichens (as well as with a vast quantity of other stores), our party of nine adults and six children sailed from Port Albert a few days before Christmas 1966.

We established camp on the shore of West Cove (Bulli Bay), on Erith Island, and after some days settling in made a preliminary reconnaisance of the swashway area between Erith and Dover Islands which indicated the feasibility of landing and supplying a small advance party. Although the swashway dries to a formidable bed of granite boulders, there is enough of a sandy beach to permit the pulling-up of a dinghy, and the placing of it beyond the reach of the six to eight foot tides. On 2 January 1967 a firm footing was finally established on Dover Island. Stores and some personnel came in by powered dinghy from West Cove, others made their way overland and across the swashway, and our Dover Island camp was eventually established some four hundred feet up under Mount Mullett, the beginning of the main ridge of the island.

Our way up to the site finally chosen for the camp led us for a considerable distance through thick tussock grass, fit cause for nervousness had we not been confident by this time that the Kent Group is blessed by the absence of venomous snakes. (The White-lipped is the only reported species, and even these are rare.) Penguin runs, the strong fishy smell and an occasional dead chick were evidence that these birds here, as elsewhere, will travel an astonishing distance from, and height above, the sea. After some two hundred feet of verti-

cal distance we reached a level where granite faces interspersed with tea-tree and other low shrubs and bushes took over from the tussock grass, and this characteristic vegetation persisted for some two hundred feet further, until we reached the casuarina forest which is the true hallmark of Dover Island—although the casuarinas are found in groves rather than as an overall cover. There is quite a dramatic transition from the rock-scrambling and bush-bashing of the climb up towards Mount Mullett to the quiet and shaded—even gloomy—atmosphere of the casuarina groves, with their thick carpets of twigs and needles overlying the granite substratum. Where the casuarinas are in dominant command of the botanical scene progress is much quicker under their protection, but unfortunately this is only met with in isolated patches. On this occasion we were delighted to pass swiftly over Mount Mullett and find, on a great granite slab facing south-westerly on the further side, a splendid panorama of the main massif of Dover Island and of the coast and cliffs looking out to craggy South-West Island and Flinders' Judgement Rock. Although our labours had not been excessive we permitted ourselves the indulgence of reflecting that few, if any, men had previously enjoyed this dramatic perspective.

Our pleasure was somewhat muted, however, by the immediate discovery that further progress along the main ridge was going to be a matter of the greatest difficulty. The prevailing westerlies have laid the scrub sharply over so that anyone wishing to proceed down the ridge of Dover Island from Mount Mullett meets a *chevaux de frise* of spiky, almost impenetrable opposition. The dominant vegetation is leptospermum, laced with the iron-hard and often quite dangerous dead branches of decades, perhaps centuries of decay and renewal. Later and renewed attempts to break through this barrier, often many feet over our heads, led us to the opinion that it could only be conquered by a reasonably large and determined band, well armed with brush-hooks to cut a track for themselves, and with plenty of time on their hands. The best way to reach the main peaks of Dover Island, however—which we failed to do—would be to come in from the sea and climb straight up, preferably from the west so that the lie of the scrub is with you. The highest peak is 774 feet, and lay rather less than a mile from our lookout position on Mount Mullett. It could easily take a small party several days of very hard work to make it along the ridge. If it has ever been climbed—and this seems unlikely—it would certainly have been by the method we recommend.

Such reflections as these, however, were cut short by the fading light, our need to make camp and our knowledge that our portering party had a long trip home. Two small tents were erected on Mount Mullett and J. H. Mullett was left with the company of two young members of the party, Anthony Stephens and David Murray-Smith.*

For the next two days investigations and collections were confined largely to the area in the immediate vicinity of the camp site. It was already clear to us that there was abundant scope for a great deal of future research on Dover Island, covering many scientific fields, and that there was more than enough to do, even in our own restricted area and even with our de-

* Others who played a considerable part in establishing and supplying the camp on Dover Island, apart from those mentioned in the text, include Mr. Robert Newton and Mr. Stephen Rosenman.

cision to concentrate on botanical collections. One important topographical break-through, however, was the discovery on our second morning on the island that we were not as strongly locked up by the vegetation as we had feared. From some prominent lookout rocks close to our camp site a possible route south-west could be discerned, leading towards Myrmidon Bay and staying fairly close to the cliff tops. Several hours exploration confirmed the feasibility of this route, and laid the foundation for our successful cross-country traverse of several days later.

For, after the abandonment of our original camp, we came to the conclusion that even a preliminary survey of Dover Island such as we were engaged on necessitated some attempt to establish a line of march, so to speak, through as varied a tract of country as possible. With this in view

Jack Mullett, on whose field notes much of the accompanying article is based, died in Melbourne on 20 March, 1967, at the age of 48. He was a man of great intellectual honesty and of great courage. He spent much of his working life in the newspaper industry, but in recent years he was a successful science teacher, and indeed his life was largely dedicated to the rigorous investigation both of aspects of "science" as we commonly use the word and also of the "science of society", more generally speaking. Modest, withdrawing, ironic and antisentimental in his personal make-up, he was a splendid companion, critical (he approved of Karl Marx's motto, "Doubt everything") but also deeply humane.

Jack Mullett knew from the middle of 1966 that he was going to die of lung cancer, and from the time he resigned from the Education Department he determined to make one final and personal contribution to the cause of scientific investigation. No-one knew better than he that an expedition such as we describe in this article could only make the most minor of contributions to the investigation and understanding of the problems that surround us, but it was characteristic of Jack that this encouraged rather than deterred him. It was on his suggestion

four adults set off from our base camp in West Cove in our dinghy, together with a boy to bale, as they say in the classics. We had hoped to be able to float through the swashway at high tide, but delays necessitated some portage over the mid-section. However it was thus possible to reach the western side of Dover Island without circumnavigating the island, which would have been difficult and perhaps risky with the small boat we had at our disposal. Having passed the swashway it was a relatively simple matter to motor some distance down the western shore of Dover Island to the deepest indentation of Myrmidon Bay, where, from the heights of Erith Island, we had thought that we had descried a beach suitable for landing purposes. The "beach", however, proved to be a formidable mass of slippery granite boulders, some as big as an armchair in size; with the

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that we returned to the Kent Group in December 1966.

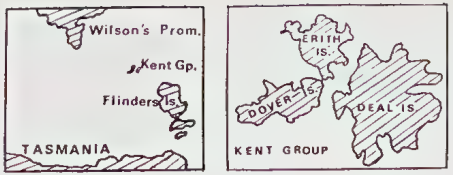
During the course of this expedition Jack Mullett was called on to perform tasks and to live in conditions which no-one in his physical condition should normally face. Even when wracked with pain, and forced to withdraw to his tent to treat himself and to rest, he never complained, and he took a full part in the activities of our camp. Only one thing tried his patience: the procrastination of the rest of the party when it came to actually getting the Dover Island investigation launched. Even here, though, his innate good manners, and his conviction that the desires, no matter how urgent, of one member of a party could not be expected to influence the actions of others, constrained his protests.

On Dover Island, for part of the time alone, Mullett must have realized that the silence and remoteness and loneliness he was faced with was a paradigm of his own imminent passing out of existence. Yet he carried much equipment with him, including heavy reference books; he kept scrupulous scientific notes; and he undertook two journeys in circumstances so hazardous and forbidding that able-bodied members of the party declined the challenge involved. In particular his overland scrub-bash from Myrmidon Bay back to the swashway was an epic of bravery and determination and scientific dedication which none of us who were with him on the island will ever forget. It may have shortened his life, but Jack would have been the first to say "So what?".

It would have been nice if Jack Mullett could have made some dramatic and scientifically sensational discoveries on Dover Island. (Incidentally, his objection to the accompanying article, over which he cast his eye—he was already blind in one—just before he died was, predictably, to growl that it was too much like a Fitzpatrick traveltalk!) But this, of course, was not the point. His place of honor is as a representative of the great army of little-known men who are caught up with the vision of pushing back the black frontier of ignorance and deception. To his friends he will live for this vision as part of his personal qualities. To others, all he would want is that, some day, his work be of some use. No doubt it will be.

As stated elsewhere, the Nomenclature Board of the Tasmanian government has named a geographical feature on Dover Island after J. H. Mullett. His friends intend, in the course of time, to erect a small cairn there in his memory.

S. Murray-Smith



Erith Is..

Swashway

*Myrmidon Bay

*Nautilus Bay

*Francis Pt.

Mt. Mullett

*Beagle Point

------ indicates party's tracks

about 1000 yards

DOVER ISLAND

655 Mt. Keary

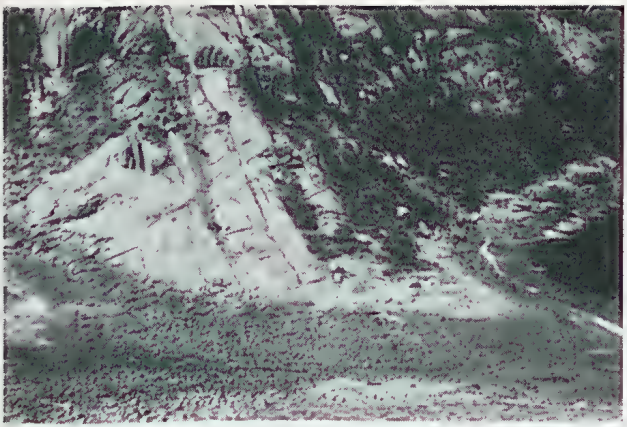
774 *Hoskyn's Peak

West Bluff

747 *Philpott's Peak

*Norfolk Pt.

MURRAY PASS



Looking down the Swashway (lowtide), from the slopes of Mt. Mullett. Erith Island is opposite. (Dinghy is in lower foreground, just right of centre.)

Photo: J. H. Mullett

prevailing swell from the west, this made our landing operation a difficult one, especially as the dinghy had to be lifted out of the sea. Once ashore we decided to split forces, two staying to prospect the slopes above Myrmidon Bay while J. H. Mullett and Mrs. Gerd Free set off to walk back overland to Mount Mullett and the swashway. Here they were to be met by the two members left behind at Myrmidon Bay, who by this time would have retrieved the dinghy and have returned to the swashway to wait for them.

This five-hour overland journey was undoubtedly the most interesting of our island experiences. One suspicion it confirmed was that, despite streams marked on the charts, and despite gully-lines of vegetation which can be discerned from off-shore, there is no free water on Dover Island: though no doubt there are intermittent springs flowing after heavy rains, and the nature of the granite faces and the gullies running down them indicates copious flows during wet weather. None of this appears, however, to be retained. Our impressions, too, of light soil cover, with a lavish overlay of vegetable detritus, were also confirmed.

After leaving Myrmidon Bay we started walking along the foreshore. We could see our destination—some great boulders on the west side of Mount Mullett—and it seemed to be

Landing point at Myrmidon Bay, north coast of Dover Island.

Photo: J. H. Mullett

within easy reach, a couple of hours away at the most. We had some large plastic bags for collecting, and a slasher which had seen better days. From the foreshore we struck off up a granite outcrop, making diagonally for the next such exposed surface, with the object of getting above the cliffs which line the east end of Myrmidon Bay. The going was fairly easy at this early point, with knee-high tussocks interspersed with trees.

About half-way to the second granite outcrop, and close to some rocks, we found some scattered bones and—in a cleft in the rocks—some small white feathers. We have assumed that these remains were those of a Brush-tailed Possum and a sea eagle. Continuing upwards, and collecting as we went, we were forced to strike inland, and came across a bare oval patch of ground, between ten and twenty feet wide, where charcoal was observed among the soil. We were to strike ten or twelve such sloping patches of ground, some smaller in size, and we came to the conclusion that they might be sections of a water-course. Their perimeters were always strikingly clear.

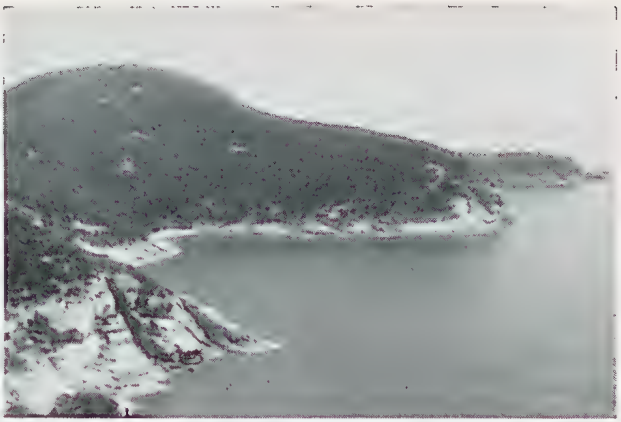
In our search for a ridge leading to Mount Mullett we were driven increasingly inland and up to a height of some four hundred feet. It was thus that we came on a gully, much lusher than the kind of terrain we had previously met, where we found the first of the clumps of eucalypt we were to meet. These trees were no higher than fifteen feet, and although we climbed them there were no flowers or fruit to collect for identification.

From a further granite outcrop we discovered that we were off course and corrected our direction, shortly afterwards sighting a furred mammal which we think was a Brush-tailed possum. Our way now lay through very dense leptospermum, well above head height and requiring continual slashing. For lengthy periods we were forced to crawl in a limbo of dead fallen timber and tightly ranked spiky growth that made progress slow and arduous. We could only see the sky when we cleared a resting place at the base of the dry, brown scrub and looked straight up. This part of the journey took about one and a half hours.

Next we encountered a grove of casuarinas, and then more tall scrub, before the going became more open, with more eucalypts. The eucalypts we found on this journey, together with a single specimen of pine, were probably our most unexpected discoveries, as until this time we had not suspected the presence of these species on the island. We were closer to the shore now, and came to the last stage of our journey with a stiffish climb up to our objective of Mount Mullett, and then a further short distance to a view of our friends, far below, waiting for us at the swashway.*

Meanwhile the party at Myrmidon Bay, consisting of Ian Free and Stephen Murray-Smith, climbed up an apparent watercourse to a height of some three hundred feet, through a ground cover of sappy rock-creeper, interspersed with tussock. After a stratum of tea-tree the dominant tree was again the casuarina, many of these latter being large trees with girths of up to thirty inches and heights of up to fifty feet. (These heights, however, are not vertical heights, as the trees are usually at an acute angle to the ground.) Fallen trees and branches litter the ground and impede progress. Lichens were abundant and were added to our collection, and a specimen of tree fungus was found. Time was short, however,

* The authors are grateful to Mrs. Gerd Free for her description of this journey, which has been closely followed.



Myrmidon Bay and Francis Point from Mt. Mullett.

Photo: S. Murray-Smith

for this party, as an attempt had to be made to re-negotiate the swashway in the dinghy before the tide dropped too far.

The details of our botanical discoveries on Dover and Erith Islands are listed below, but at least we may note here that we collected 49 native and 9 introduced species, six indigenous and eight alien species turning out to be new records for the Kent Group. Of special interest is the fact that seven alien species have been established on Dover, despite its freedom from the hand of man.

It was not our intention to collect in other disciplines, but some random observations should be placed on record. Bird songs at dawn and dusk indicate that there are few species on the island. A small flock of parrots was seen feeding in the scrub, distinguished by red crowns and blue-tipped wings. These are possibly the swamp parrot (*Pezoporus wallicus*) discerned by the 1890 party on Erith Island, but are perhaps more likely to be the migratory Blue-winged parrot (*Neophema chrysostoma*). Two hawks or eagles were seen. As far as insects were concerned, no systematic collecting was possible, but the excavation of camp sites disclosed numbers of scorpions, and large huntsman-like spiders were frequently found under loose rocks, especially on the granite outcrops; they showed a decided negative phototaxis (antipathy to light). One member of the party reported seeing a green or grey snake on the slopes above the swashway, but other members unkindly concluded that it may have been a large lizard. Certainly there is no present justification for the reputation of these islands in some nineteenth century literature as a haunt of the tiger snake. Large numbers of skinks were observed, including a species with rudimentary rear legs, *Rhodona bougainvillii*.

Tracks and fresh dung indicated, from our first landing on Dover Island, that there was a fairly large marsupial population of some kind, but no sighting was made until the Myrmidon Bay-Mount Mullett traverse, when a large, brown, furred mammal was seen. Subsequent investigation and the discovery on neighboring Erith Island of a mummified carcase makes it highly likely that the animals concerned are Brush-tailed possums (*Trichosurus vulpecula*).

Because of its considerable size, its isolation, and the fact that no trace of general burning-out was found by us, Dover Island remains a unique subject for continued research work in the

ecology and ecological history of the Bass Strait area. It is, fortunately, of no exploitable value to man, and it is highly desirable that it be proclaimed a national reserve by the Tasmanian government as soon as possible.

It is intended to persevere with the investigation of Dover Island and others in the Kent Group in coming years.

Finally, we are most grateful to Mr. J. H. Willis not only for his enthusiastic support of our little venture but also for his determination of the species of plants collected on Erith and Dover Islands as set out in the following list.

(In this list D indicates origin on Dover Island, E on Erith Island, * indicates an introduced plant and † a new record for the Kent Group.)

Ferns

Pteridium esculentum (D)
Asplenium obtusatum (E)

Conifer

Callitris rhomboidea (D)

Grasses

Poa poiformis (D)
†*Vulpia-myuros (D)
*Aira caryophyllea (D, E)
†Danthonia caespitosa (D)

Other Monocotyledons

Lepidosperma ? gladiatum (D)
Centrolepis strigosa (D)
†Juncus maritimus (D)
Dianella revoluta (D)

Dicotyledons

Casuarina stricta (D, E)
Rhagodia baccata (D, E)
Disphyma australe (E)
Carpobrotus rossii (D, E)
Tetragonia implexicoma (D)
Crassula sieberiana (D)
Acacia mucronata (D)
A. verticillata (D)
Pultenaea daphnoides (D, E)
†*Medicago lupulina (E)
Swainsona lessertiifolia (E)
Geranium solanderi (E)
Correa reflexa var. nummularifolia (D, E)
Comesperma volubile (D, E)
Pomaderris oraria (D)
Pimelea linifolia (E)
Eucalyptus obliqua (D)
Leptospermum laevigatum (D)
L. scoparium (D, E)
Kunzea ambigua (D)
Calytrix tetragona (D, E)
Apium prostratum (E)
Epacris impressa (D)
Styphelia oxycedrus (D, E)
S. parviflora (D)
†*Anagallis arvensis (D)
†*Centaurium ? pulchellum (D, E)
Alyxia buxifolia (D, E)
Myoporum insulare (D)
†Sambucus gaudichaudiana (E)
Goodenia ovata (D, E)
Stylidium graminifolium (D, E)
Brachycome diversifolia var. maritima (D, E)
Olearia phlogopappa (D, E)
†*Gnaphalium candidissimum (D, E)
G. luteo-album (D, E)
Helichrysum argophyllum (D)
H. dendroideum (D)
H. paralium (D)
†Calocephalus brownii (D)
†*Senecio elegans (E)
†S. linearifolius (E)
S. lautus (D)
†S. capillifolius (E) (if distinct from S. *lautus*)
†*Hypochaeris glabra (D)
†*Sonchus asper (D)

Mosses

Weissia controversa (E) (large cushions)
Sematophyllum homomallum (E)

Reference Notes

[1] *Historical Records of New South Wales,* Vol. III, p. 772.
[2] Plomley, N. J. B. (ed.)—*Friendly Mission* (Tasmanian Historical Research Association, 1966), pp. 338-9.
[3] Tasmanian State Archives, CSO 20/15/308.
[4] Nixon, Francis R.—*The Cruise of the Beacon* (London, 1857); Rev. Canon Brownrigg: *The Cruise of the Freak* (Launceston, 1872).
[5] Matthew Flinders—*A Voyage to Terra Australis* (London, 1814), Vol. II, p. 535.
[6] Currey, J. E. B. (ed.)—*Reflections on the Colony of New South Wales* (Melbourne, 1966), p. 125.
[7] *Victorian Naturalist,* Vol. 7, No. 9, 7 January 1891, pp. 121-139.
[8] *Argus,* 23 January 1909.
[9] *Victorian Naturalist,* Vol. 75, December 1958, pp. 128-130.

Dudley Dickison — Student of Birds and Books

By A. H. Chisholm

When Dudley John Dickison died in Melbourne, on April 22, 1967, a highly useful career in the study of Australian birds and books came to an end. During at least 50 years Mr. Dickison had been a faithful observer of birds in various parts of Victoria, and during much of that period he had applied himself with diligence and discrimination to the history of Australian ornithology and to the collecting of printed Australiana. His library became therefore one of the most valuable private collections of its kind in Australia.

Additionally, he had been for 42 years an official of the Royal Australasian Ornithologists Union, most of the time as honorary general secretary. Moreover, he had a lengthy association with, and a warm affection for, the Field Naturalists Club of Victoria.

A sturdy product of Gippsland, Dickison was born at Warragul on October 10, 1896. He transferred to Melbourne as a young man (about 1914) and became a clerk in a governmental department. As his youthful interest in birds strengthened he associated with like-minded men, notably the late Ray Littlejohns of lyrebird fame, but for the most part he was content to wander alone, looking and listening in bush areas near Melbourne.

Knowledge gained on such excursions was freely shared. I have reason to recall this because on several occasions he took me to see special discoveries he had made, among them nests of the Crescent Honeyeater and a couple of little-known hawks; and

Dudley Dickison at nest of Goshawk near Melbourne.

Photo: A. H. Chisholm

in one instance he revived his early tree-climbing ability by swarming up about 50 feet and bringing down a young hawk for photographic purposes, and then taking it back to the nest.

Doubtless because of their grace and power, hawks were his favourite birds. In his earlier days he went frequently to the Werribee Gorge and kindred areas to watch wedge-tailed eagles, and it was, I think, through his co-operation that David Fleay obtained the famous "Horatia": taken as a chick in 1937 from a nest on a wall of Coimadai Gorge, near Bacchus Marsh.

Hawks were studied also on frequent visits to Toolern Vale, and concurrently, of course, attention was given to all other bird-species available there. Toolern Vale (where a birdmen's cabin had been erected on the Davey property) was in fact "Dicko's" chief observing point in recent years. He also got about elsewhere—though rarely travelling far afield—but, as he lamented to me in his last letter (March '67), "secluded spots" within 25 miles of Melbourne had become of late quite scarce. (In the same letter, by the way, he loyally expressed the hope that sound obituary notices would be published to commemorate two birdmen who died last year).

According to Whittell's *Literature of Australian Birds* (1954), Dickison's first published writings were several notes that appeared in the *Victorian Naturalist* in 1923. In later years he wrote numbers of other notes in this journal and the *Emu*, all of them informative items. Generally, he restricted himself to brevities, but when dealing with historical subjects, as for example the early records of ornithology in Victoria (*Emu*, Jan. 1932) and a discussion of the major works of John Gould (*Emu*, Oct. 1938), he necessarily became much more expansive. These two papers, important in themselves, remain as indications of their author's informed knowledge of Australian ornithological history, a field which is sometimes subject to neglect.

Here I should say, too, that D. D. assisted me materially with historical research on several occasions. For one thing, when I was engaged in the writing of *Strange New World* (the story of John Gilbert and Ludwig Leichhardt), he spent night after night delving in old newspapers in the Melbourne Public Library, and from time to time came up with very useful information. He also assisted me substantially in the production of *The Story of Elizabeth Gould*. More recently, he disinterred the earliest reference to the name "pilot-bird", a point that had hitherto been almost completely obscure.

It is indicative of our late friend's devotion to bird-study that he remained so long general secretary of the R.A.O.U.; for, being a heavily-built, open-air type, he did not naturally take with ease to secretarial work. What impelled him to continue in the position was his belief, soundly based, that he was serving, in his own quiet way, the best interests of the Union. Thus, and in spite of his customary placidity, he was apt to become annoyed occasionally by what he regarded as indiscreet actions of some officers, and on at least two occasions in the 1940s, when I was acting for several years as Chairman of the R.A.O.U. Council, he gave me his resignation. But, on each occasion, after a few mollifying words had been directed at him, his slow smile returned and he nodded agreement as the resignation was torn up.

During the past year or two it had become evident that D. D.'s health was failing. He had, he said in a letter, been to Toolern Vale only twice in 1965 and not once in '66, and he

doubted if he would ever get there again. Nevertheless, he retained to the end his attachment to birds and books, and was always interested to hear of happenings in the R.A.O.U., the F.N.C.V., the Bird Observers Club, and kindred bodies in other States.

Much sympathy has been tendered his widow, Mrs. Agnes Dickison, in her loss. There were no children.

Field Naturalists Club of Victoria

F.N.C.V. General Meeting—10 July 1967

The Herbarium Hall was full for the meeting with the President, Mr. W. L. Williams, in the chair. He extended a welcome to the guest of the evening, Mr. J. Ros Garnet and his family, and Mr. and Mrs. Jordan from the Wimmera Field Naturalists Club which nominated Mr. Garnet for the Natural History Medallion.

Apologies were received from the Honorable Mr. Manson, Minister for State Development. Mr. Lawrence, Chairman of the Forest Commission; Mr. Lane of the C.S.L.; Dr. Smith, Chairman of the National Parks Authority; and Mr. Ivo Hammett. The minutes of the previous meeting were taken as read and confirmed on the motion of Mr. A. J. Swaby and Mr. E. Allan. The President announced that Mr. Bland had consented to become Auditor of the Club. He also brought to notice that the Native Fauna Conservation Society was holding an exhibition of nature photography at the Kodak gallery until July 22nd; and that the Blackburn Tree Preservation Society and Templestowe and Doncaster Flower Show Committe will be holding a flower show in the Mitcham High School in October.

He said that a biography of the late Tarlton Rayment "The Memory Lingers On" by Lynette Young, has just been published.

The Secretary (Mr. D. Lee) announced that the meeting of the Native Plant Preservation Society will be held in the Adult Education Rooms on July 18.

The President introduced Mr. R. T M. Pescott, and asked him to present the 1966 Natural History Medallion to Mr. J. Ros Garnet.

Mr. Pescott reviewed the purpose for which the medallion is awarded, recalling that in 1939 Mr. J. K. Moir and natural history enthusiasts in the F.N.C.V. decided to make an annual award in the form of a bronze medallion to a person for their contribution to natural history. Mr. Moir bore the cost of the design competition and the making of the medallion until his death. The F.N.C.V. has since provided for the medallion.

After the presentation of the medallion, the President read congratulations from Mr. Ivo Hammettt who said, "I can think of no-one who deserves it more", and from Dr. Smith of the National Parks Authority who sent congratulations on the "well deserved award", and from Messrs. Greenaway and Rossiter.

Mr. Garnet then gave a lecture on "Conservation—Of What? For Whom? By Whom?". He said that in the deliberately planned preserving and keeping of natural flora and fauna and of natural resources, the club has taken an active part.

In 1884 Gregory and Lucas recommended to the Government the preservation of Wilson's Promontory, and in 1908 (20 years later) it was made a national park. An enquiry by Field Naturalists following Arthur Mattingley's publication of the cruelty to egrets on the Murray, stirred public opinion; but it took years to stop the destruction. The same destructive forces were threatening the platypus,

echidna, lyre bird, and wildflowers; and it became apparent that the scenic beauty of areas around Melbourne were in danger. The F.N.C.V. began a campaign resulting in the Wildflowers Protection Act.

Now we believe that we should protect not only the fauna and flora but places where they live—their habitat must be protected. The Yarra bank near the Herbarium provided nesting places for numerous species of birds, the Kooweerup Swamp harboured birds, but the swamp has been drained and Melbourne has eliminated the ecological factors for preservation of birds.

In this "world of no returns", before the year 2000, it will be too late to reconstruct habitats. Mr. Garnet gave alarming figures of the percentages of land occupied already, with only 6.5% unoccupied—the only place from which we can create parks.

It is estimated that in 26 years it could be used up; with an estimated possible 42,000,000 bodies of man and other mammals, to feed and occupy a space in which there will be no spare square yard.

Loss or alteration of habitat has been caused by cultivation, land erosion because of lack of wisdom by man, mining and dredging destroying the surface, quarrying, too frequent fires, coastal erosion, salination of streams, road construction, and destruction of cover on mountains, desnagging of streams and pollution of streams by effluents, and of land by toxic chemical sprays.

Mr. Garnet gave a disturbing list of animals and plants already lost, and those in danger of extinction; and he emphasized the need to exert influence to preserve habitats so that those who come after us may enjoy what we enjoy. He showed beautiful colour slides of rare animals, including reptiles, birds and mammals, and of plants from Wilson's Promontory, the Grampians, Mallee, and Warby Ranges. He stressed that the Warby Ranges should be made a National Park.

The President thanked Mr. Garnet for the interesting address, Mr. Pescott for presenting the medallion, and Miss Joan Woollard for projecting the slides, most of which Mr. Garnet announced had been photographed by Messrs. F. Pinchem, L. Robinson, R. Wheeler, G. Pizzey, W. King, and Mrs. Garnet.

The President then reported that he and the Secretary (Mr. D. Lee) and three representatives of the National Parks Association (including Mr. Garnet), had waited on the Minister of National Development to put the legal case that it would be illegal to construct a lake on Mt. Buffalo at Tatra Inn.

They found that three years ago in 1964, when the lease was signed, provision for the construction of the lake was included in the lease. The National Parks Association members succeeded in showing the Minister that it was contrary to the National Parks Act, and implied a threat that legal action could be taken. So far no approach has been made to the government with definite plans for the lake. The minister has promised that full consideration will be given if and when the matter comes before them.

Mr. R. Taylor said that whoever prepared the lease had been guilty of a very careless attitude towards the provisions of the National Parks Act, and the authority has no power to construct a lake, nor has any agency engaged to do it. He suggested that members of the club write and ask the National Parks Authority if it had prepared the lease, and if so, why? We must preserve what we think has been protected.

Mrs. Woollard stressed the need to keep highland bogs to conserve water supplies lower down.

The Secretary announced that representatives for the Australian Conservation Foundation may be voted for, and suggested that the Council of the F.N.C.V. should vote for three representatives from a list of candidates whose names be read out. He also said that rock damaging by "gem-hunters" had been banned at Point Leo.

Mrs. G. Taylor said that there would be a meeting in the Herbarium Hall on 9th August to consider the preservation of Lake Pedder in Tasmania. Funds will be needed. Mr. J. Baines asked Mr. Pescott if there would be any inroads into the Botanic Gardens in building a licensed restaurant there. Mr. Pescott said that only the Licensing Court could decide about the licence, but he recommended the building of the restaurant which would in no way act detrimentally to the gardens. At night it would be segregated by gates shutting off the gardens.

EXHIBITS

Cordyceps—the vegetable caterpillar brought in by Mr. H. Haase.

Ordovician fossil shells from Ellery Creek and plant fossils from Lake Hart, brought by Miss Jean Blackburn.

A sturdy mistletoe on a stem from Mr. R. Riordan.

Mrs. O'Donnell reported a flock of White-naped Honeyeaters over an *Acacia baileyana* tree in Greensborough.

Two new members and two subscribing institutions, whose names appear in the July Naturalist, were elected.

Botany Group Report—15th July

On Sunday, 10th July, eleven members went for an excursion to the coastal swamps near Altona and the coast near Little River. Many plants were identified; some of them including species like *Salicornia blachiana, Anthrocnemum kalecnemoides, Atriptex cinerea, Frankenia* sp. and *Suaeda australis,* the leaves of which revealed some beautiful colours ranging from green, pink and red, to purple shades. This excursion was arranged with the Nature Show in mind.

At our last meeting Mr. B. Fuhrer took the chair. Mr. J. Willis was our speaker and his subject was "Flower Perfumes". He gave an outline of the "Kerner" classification of "Major Groups of floral scents" and these are as follows:

i Indoloid scents, as in *Hydrocotyle laxiflora* (Stinking Pennywort).
ii Aminoid scents, as in Crataegus (Hawthorn) and Photinia.
iii Heavy scents, as in Gardenia, Jasmin and Privet.
iv Aromatic, spicy scents, as in Stock, Gorse and some Acacias.
v Alcoholic, fruity scents, as in Vitus and Magnolia.
vi Honey scents, as in Melaleuca, Banksia and Kunzea.
vii Musky scents, as in *Melaleuca nodosa.*
viii Animal scents, as in *Callicoma serrulata* (goatlike) and *Melaleuca suberosa* (sheeplike).
ix Minor groups of scents, as in Poppy, Violet, Daphne.

Boronias, as Mr. Willis pointed out, have a distinctive scent only found in Australia, and not falling in the above-named major groups. He also pointed out the importance of scent as an assistance in identifying plants. For example some Eucalypts can be identified in this way. Many scented flowers were displayed by Mr. Willis, and a number of questions were asked afterwards.

Mr. Fuhrer thanked Mr. Willis for his informative talk, which was enjoyed by everyone.

An excursion was arranged to the "Brisbane Ranges", meeting at Batman Avenue at 9.30 a.m., and Bacchus Marsh, 10.30 a.m. on Sunday, 13th August 1967.

Geology Report—7th June

22 members attended. Mr. Davidson took the chair in the absence of Mr. Dodds.

The subject for the evening was a reading of a report on the advancement in geological knowledge since 1962.

Mention was made of the more detailed mapping of sedimentary basins throughout the Continent and the Continental Shelf as a result of exploratory drilling for oil, and the discovery of new basins beneath younger rocks.

New deposits of important ores have been discovered in many parts of the continent, the most outstanding being the iron ore deposits of the Hamersley Ranges, where estimates of 8,000 million tons of Haematite, and 6,000 million tons of Limonite have been found. New important discoveries were unicellular micro-organisms in rocks of Proterozoic Age, 1,400 million years old, and a primitive jawless fish of Ordovician Age.

Advances were made in the science of Palynology (a branch of Palaeontology), where new techniques have permitted a greater use of Conodonts and Ostracods for stratagraphic zoning. An interesting discovery was of beautifully preserved Glacial Pavements, the result of a glacial transgression over the western part of the continent between 750 and 800 million years ago.

Mrs. Salau, who arranged and read the report, was thanked by the Chairman for an excellent presentation.

EXHIBITS

Mr. McInnes—Striated Glacial Pebble; Pykes Creek.

Mr. Davidson—Assorted Silica Semi-precious stones including Amethyst, Morion (black quartz), Citrine, Rutilated Quartz, Smoky Quartz, Aventurine Quartz, Rose Quartz. A Geode from Mexico.

Miss Boardman—Silver-lead ore, Talc, Mica, Galena; Broken Hill. Azurite; Mannahill, S.A. Fossil Worm Tracks; Waterhouse Range, Cent. Aust. Crystal Tuff; N.Z.

Miss Keedy—Rock Phosphate; Ocean Island. Globular Calcite in Older Basalt (from test bore, lower Yarra crossing site 160 ft level).

Mr. Gunn—Siderite, Quartz and Pyrites, Devils Dice, Sillamanite; Thackeringa. Pink Felspar and Mica, Serpentine; Rockwell, S.A. Scheelite, Tourmaline, Biotite and Felspar, Copper, Fluospar; Broken Hill. Garnets in Pegmatite; Broken Hill. Copper; Burra, S.A.

Mr. Francis—Geothite; Leongatha. Mispickel; Maryborough, Vic. Arseno-Pyrites. Marcasite, Petrified Wood; Morwell.

Mr. Whatmough—Shell casts and shells; Kalimna, Vic. Shells and casts in Limestone (Mid-Devonian); Buchan.

Mr. Box—Rose Quartz; S.A. Moss Agate; W.A.

Mr. Sault—*Tetragraptus* sp (Lower Ordovician); Dromana.

5th July—24 members attended with Mr. Dodds in the chair.

Mr. Box reported on the visit to the National Museum by the Group. It was well attended.

As the meeting was a members' night, there was a varied programme. Mr. Wigmore showed slides of the Mootwingee area describing the physical features there, also the Aboriginal cave-paintings. He also showed slides of the recent excavations at Keilor, where the human fossil remains were unearthed. These slides clearly showed the methodical way in which an archaeologist goes about his work.

Mr. Skopakow showed a movie taken on an earlier excursion by the group to the Bealiba-Dunolly gold field area. Discussion took place on many aspects of geology, also on the specimens exhibited.

Exhibits

Mr. Neilson. Agates, Agate Creek, Qld.

Mr. Wigmore. Silver lead zinc ore, with Rhodonite, Broken Hill. Magnetite crystals.

Mrs. Skopakow. Geothite, Davidite, Serpentine and Jasper, Banded Jasper.

Mrs. Salau. Aboriginal grinding stones, Heathcote. Diabase, Mt. William. Fossil leaves (Tertiary), Morwell.

AT LAST !

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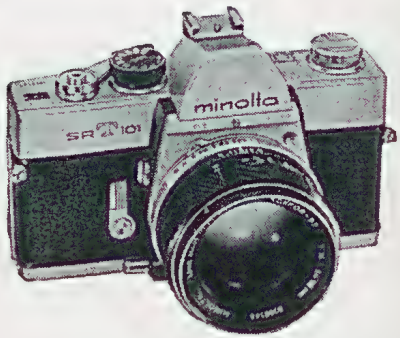

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Marine Biology and Entomology Group Meetings—June and July 1967

June—This meeting was attended by 15 members and was chaired by Mr. R. Condron.

Nominations were called for election of Chairman and Secretary; Mr. R. Condron was nominated for position of Chairman and Mr. J. Strong for that of Secretary. As there were no further nominations, the abovementioned were duly elected.

Mr. McInnes reported that good progress is being made for the Nature Show to be held in August. Members were working very hard to complete the cave display. He has asked for hessian and wire netting. These have been promised.

It was suggested that this group put on an exhibition of marine life, collected in a certain area. After some discussion, the area selected was Ricketts Point.

Mr. Condron suggested an outing to the Doncaster area, for specimens of pond life. It is hoped that this can take place on the Saturday, prior to the show. Further discussion will take place at the July meeting.

As this was a members' night, there was no guest speaker.

Exhibits

Mrs. Strong showed 9 different species of seaweed collected from Cape Woolamai.

Mr. Condron showed some bivalves which he had collected at Mordialloc on a very low tide. Mrs. Strong identified these as "the little bean shell" *Pullastra fabagella*. He also showed two Orchard Swallowtail butterflies, *Papilio aegeus aegeus*.

Mr. McInnes exhibited some scale galls and said as far as he could see, they contained no insects. Mr. McInnes also showed a photo from Christmas Island, of crabs crossing the road from the jungle to the sea.

Mr. Kelly showed some beetles of the Chafer family and gave a short talk on them. He explained that they were a spectacular family of beetles. Most of them had been taken around Melbourne.

Mr. Strong showed some larvae of the Wanderer Butterfly (*Danaus plexippus*), taken at Phillip Island. Miss White identified their food plant as a species of milkweed, *Asclepias rotundiflora*.

Also shown was a juvenile red-back spider (*Latrodectus mactans*), under low microscopic magnification. He explained that this specimen was an early instar and was different in colour to an adult.

Some Goose Barnacles taken at Phillip Island were also shown. These were alive and very active.

July—The meeting was chaired by Mr. R. Condron, 18 members being in attendance.

Mrs. Strong informed the group that Mrs. Z. Lee had had an operation and was making good progress. All members conveyed their wishes for a speedy recovery, and hoped that she would soon be back with us.

Mr. Condron reported that he had received a letter from Mr. Smithers of Sydney, in reply to his, in which he mentioned the obtaining of caterpillars from Swan Lake and Phillip Island.

Mr. Strong reported that Mr. Setford had taken himself and Mrs. Strong to Ricketts Point on Sunday last. Several species of seaweed, shells and one or two other forms of marine life were collected. It is hoped to make further

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trips to this area, with a view to collecting as many varieties of marine life as possible for the forthcoming Nature Show.

Guest speaker for the evening was Dr. Ian Hiscock, Senior Lecturer in Zoology, Monarch University. His subject was "A General Talk on Jellyfish".

This proved to be a very interesting and absorbing lecture. Dr. Hiscock made free use of the blackboard to illustrate his points, and also showed some slides of general survey of jellyfish was given, and explanation of the detailed anatomy of the various groups of this phylum. Dr. Hiscock also gave us the life history of a typical species—*Aurelia.* At the conclusion of his talk, the chairman invited questions from members, many of which were asked, and a vote of thanks was moved by Mr. D. McInnes.

Exhibits

Miss Dixon showed a moth and empty pupa case, which Mr. Condron said was of the family Geometridae. She explained that she had collected the green caterpillar from crysanthemums in her garden and had put it in a jar where it had pupated. It then remained dormant for 5 weeks, when the moth emerged.

Miss Jenny Force showed several beautifully set species of wasps, most of which she had collected from North Australia.

Mr. Strong showed under low microscopic power one of the tube worms, *Spirorbis.* Also a species of the Coelenterate Phylum, fam. Siphonophora; species *Velella lata,* commonly called "the By the Wind Tailor". He explained that these had been lying in hundreds on one of the beaches at Mallacoota last February.

Microscopical Group—17th May 1967

The meeting, chaired by Mr. J. Dawes, was attended by 14 members and 2 visitors.

The group discussed the matter of the Microscopy Exhibit, to be presented by them at the coming Nature Show, the procurement of materials and equipment and means of stimulating more public interest, particularly within the schools; where more explicit literature could be made available about the show and the activities of the Field Naturalists' Club.

The tentative programme for lectures was considered, and Mr. Woollard intimated that Mr. Leigh Winsor would be giving a lecture on 21st June—"The preparation of Pathological slides". Further progress had been made to obtain the services of Mr. L. Flewin on the subject of "The microscope and its use in Metallurgical investigation" for the 19th July.

Mr. W. Genery read his interesting article on the stratiomys as published in The Naturalist, March 1965, as a follow up on the specimen he had on exhibition under the microscope.

Mr. McInnes demonstrated a small container for the concentration of pond life specimens into a small area for viewing under microscopes, and keeping them within range of objective more effectively. This container was produced by Mr. Woollard, who followed up with a description of how to make these containers by cutting rings from plastic pill bottles and cementing them with Araldite Cement to slide glasses. The bottle caps are used as covers for purpose of transport.

An interesting group of exhibits were viewed under 12 microscopes on tables as follows:

Mr. C. Nance—Wood sections cut transversely, Tangentially, Longitudinally, and radially, of King William Pine (*Athrotaxis selaginoides*), Tasmania; Red Pine, Canada; stained Safarinin, magnification ×60. These sections were good illustrations of the difference in comparative growth rate between these timbers.

Mr. W. Genery—1. Stratiomys (larva), Soldier Fly, order Diptera; 2. China Marks, larva, *Calaclysta lemnata,* order Lepidoptera, family Pyralidoe; 3. Marine Crustacea, Tas.

Mr. K. Trotter and Paul Harris—1. Diatoms; 2. Sponge spicules, from Jacksons Paddock, New Zealand; 3. Illustration of polarizing light by use of selo tape compared with Scotch tape.

Mr. Paul Gethery—1. Tardigrade, female with eggs, ×150; 2. Rotifera, Brachionis, ×400; 3. Tardigrade, Pharynx, ×250 (particular reference to staining of Pharynx).

Mr. Genery further discussed types of mounting, comparing those of fresh water sponges, marine sponges and their reaction to absorption of mount fluid. Specimens exhibited were taken direct from water to mount.

Meeting closed after exhibits were viewed by all members.

F.N.C.V. DIARY OF COMING EVENTS

GENERAL MEETINGS

Monday, 14 August—At National Herbarium, The Domain, South Yarra; commencing at 8 p.m.

1. Minutes, Reports, Announcements.
2. Correspondence.
3. Subject for the evening: "Victorian Mountains"—Rodger Riordan.
4. Election of New Members.
   (a) *Ordinary:*
   Mr. Peter H. T. Uhlherr, 8 Baringa Street, Mount Waverley 3149. Introduced by H. Haase of Bayswater (Interest—Orchidaceae).
   Mr. P. G. Northey, 1612 Malvern Road, Glen Iris 3146. (Interest—Birds).
   (b) *Junior:*
   Mr. Ian Temby, 16 years, "Yallambie", Tarcoola Drive, Lower Plenty 3093. (Interest—Mammals).
   (c) *Country:*
   Mr. H. C. Mason, Don Road, Healesville 3777. (Keeper at Sir Colin McKenzie Sanctuary.)
5. General Business.
6. Nature Notes and Exhibits.

Monday, 11 September—"The Museum and the Community": Mr. McNally.

GROUP MEETINGS

(8 p.m. at National Herbarium unless otherwise stated)

Wednesday, 16 August—Microscopical Group Meeting.

Friday, 25 August—Hawthorn Junior F.N.C. meeting at 8 p.m. in Hawthorn Town Hall.

Friday, 1 September—Preston Junior F.N.C. meeting at 8 p.m. in Rechabite Hall, 251 High Street, Preston (north from Bell Street).

Monday, 4 September—Entomology and Marine Biology Group meeting. This group meets in Mr. Strong's rooms at Parliament House. Enter through private gate at south end of building.

Wednesday, 6 September—Geology Group Meeting.

Thursday, 7 September—Mammal Survey Group Meeting.

Thursday, 14 September—Botany Group Meeting.

F.N.C.V. EXCURSIONS

Sunday. 20 August—Pearcedale and district. Leader Mr. Sault. The coach will leave Batman Avenue at 9.30 a.m. sharp. Fare $1.60. Bookings with Excursion Secretary. Bring one meal.

Thursday, 31 August to Sunday, 10 September—Broken Hill. The party will leave Flinders Street opposite the Gas and Fuel Corporation building at 8 a.m. Stopping overnight at the Mildura Motel. Bring picnic lunches for Thursday and Friday. Accommodation has been booked at the Grand Private Hotel in Broken Hill, and day trips will be made in conjunction with the Barrier F.N.C., including Mootwingee, Purnamoota Field, Silverton, and Umberrumberka Reservoir. On the return journey overnight stops will be taken at Mildura and Swan Hill. All payments of $100 per person should have been paid before this is published, but if any are outstanding, please remit at once, making cheques out to Excursion Trust.

26 December to 1 January—Portland. The coach will leave Melbourne on Boxing Day and remain with the party for day trips to be made in conjunction with the Portland F.N.C. Accommodation has been booked at a Portland Motel for D.B. and B. and the cost, including coach, will be $52 per person. Bookings should be made with the Excursion Secretary, accompanied by $10 deposit (cheques to be made out to Excursion Trust).

Field Naturalists Club of Victoria

Established 1889

OBJECTS: To stimulate interest in natural history and to preserve and protect Australian fauna and flora.

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Microscopical: Mr. P. Genery, 42 Barnard Grove, Kew (86 5851).

Fauna Survey: Mrs. R. Frankenberg, 36 Percy Street, Balwyn.

Entomology and Marine Biology: Mr. J. W. H. Strong, Legislative Council, Parliament House, Melbourne, 3002.

MEMBERSHIP

Membership of the F.N.C.V. is open to any person interested in natural history. The *Victorian Naturalist* is distributed free to all members, the club's reference and lending library is available, and other activities are indicated in reports set out in the several preceding pages of this magazine.

Rates for January-December 1967 are:

Ordinary Membership	$5.00
Country Membership (over 20 miles from G.P.O., Melbourne)	$4.00
Junior Membership (under 18 years)	$2.50
Subscription to the *Victorian Naturalist* (non-members)	$4.00

All subscriptions should be made payable to the Field Naturalists Club of Victoria and posted to Mr. R. L. Smith, 430 Little Collins Street, Melbourne, 3000.

Note: The currency of the present club year and Volume 84 of the *Victorian Naturalist* is from January to December, 1967.

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Save the Lake Pedder National Park Appeal

On the 9th of August, a meeting was convened to acquaint the public of Melbourne with the significance of the principle of the inviolability of National Parks, which is at stake in this issue of Lake Pedder in Tasmania. A capacity audience was delighted with the fine slides and films shown

At the conclusion of a short address, given by Mr Peter Sims, Secretary of the "Save Lake Pedder National Park Appeal", questions were asked, and a resolution was carried.

Resolution Passed at Public Meeting held Melbourne Herbarium
Wednesday, 9th August, 1967

This meeting of hundreds of Melbourne citizens expresses its dismay at the prospect of the Tasmanian Government, or its agency the Hydro-Electric Commission, embarking on a project which would have several objectionable consequences.

The flooding of Lake Pedder and the surrounding country would result in the permanent destruction of a feature of unique scenic beauty which rightly belongs to the Australian nation as a whole.

It would result in the destruction of biological species believed to be as yet, unexamined and unclassified by scientific investigation, and thus could

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The Victorian Naturalist

Editor: G. M. Ward
Assistant Editor: W. White

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Honeysuckle Creek Rock Shelters

By Aldo Massola*

The art of rock painting does not appear to have been practised by all Victorian tribes. This presumption stems from the fact that except for three unrelated paintings in the north-east, and two widely separated shelters north of the basalt plains of the Western District, all rock paintings so far discovered are in the north and western Grampians and in the Black Range, to the west of those mountains.

Their known distribution would then suggest that either the paintings are not old, and that the art was just entering Victoria, probably from two points, the north-west and the north-east; or that, if old, this type of art manifestation was not popular with all the tribes, and therefore it did not spread. Aboriginal Victoria, in many ways, was a cul-de-sac, the furthest away from any cultural innovation from the north, and the last to receive it.

In this respect it is well to remember that rock paintings appear to be entirely absent from Tasmania, which was at the bottom of the cul-de-sac. If this is so it could be significant in view of the above.

Present indications based on stylistic similarities, are that the art came to Victoria by way of the Wimmera and Mallee from the Murray Valley of South Australia, and from western New South Wales; and across the Murray River from eastern New South Wales.

* Flat 4, 18 Wolseley Street, Mont Albert, Victoria 3127

The only way we might be able to ascertain if we are correct in this hypothesis is by finding more examples, if they exist, not only in the areas where they are already known to occur, but also in new localities. Then, by studying the styles and comparing the one against the other and by noting the difference in the details which give rise to local variations, we may be able to establish, not only the route by which they were introduced, but also their provenance. Further, by allowing for the time lag, we then might even be able to give them a relative dating.

This is why the recent discoveries of rock shelters bearing paintings in a new locality of the western Grampians is so important.

Hitherto, it was believed that in this region, paintings were restricted to the Cultivation Creek area, although two examples were discovered a little to the north, one at the Camp of the Emu's Foot, at Victoria Gap, and the other in the vicinity of the salt caves at the head of Red Rock Creek.

The examples now presented are at the head-waters of Honeysuckle, or Devil's Creek, which is some miles south of Cultivation Creek. They are thus, to the writer's knowledge, the most southerly painted shelters so far found in the Grampians.

The locality has only lately been made accessible by the Forest Commission by the bulldozing of a track. The country itself is difficult in the

extreme, and appears to have been the centre of a conflagration. The ground is entirely covered by rocks and boulders amassed in great disorder, some obviously freshly detached from larger rock masses. They range in size from a few inches to several feet. Walking over this stone field is no easy matter, even if the thick undergrowth is discounted.

In aboriginal times the thick undergrowth probably did not exist, since they were in the habit of frequently setting fire to the scrub in order to dislodge any sheltering game, or enemy. Nevertheless, they must have found it difficult to negotiate this terrain, since progress over it is merely a series of jumps from one reasonably flat rock to another. No wonder the creek bears the second name—Devil's Creek.

What we may call Honeysuckle Creek Shelter No. I., was first reported by Mr. John Donovan, of the Stawell Branch of the Forest Commission. The shelter is really a small recess in a huge overhanging rock, at least 60 ft. high and 100 or more feet in length. The "small" recess is 21 ft. wide, 8 ft. deep and 5 ft. 6 inch high. It has a north-north-east aspect and an earth floor with plenty of charcoal from bush fires, some of which is evidently fresh. The surface of the rock bearing the painting is badly flaked, and because of this some of the figures have been lost. Those that remain are mostly faded and barely visible, but could include a human figure. The only ones in reasonable condition are in two small groups, about 12 inches apart, low down on the extreme right of the wall.

The left group consists of five figures, ranging from about 4 inches to 6 inches in height, painted in red ochre, and representing the usual "lizards", so prevalent in the western Grampians. The right group consists of the remains of five lizard figures, ranging from 4 inches to 10 inches in height, and of one human figure, 5 inches high. This group was also done in red ochre.

While in the area we* endeavoured to locate Honeysuckle Creek Shelter No. 2, which had been discovered a few weeks previously by Mr. Ellis Tucker, of Brit-Brit. Such is the nature of this country that we were unable to find it, in spite of having good directions and of spending a long time on the quest. It must be admitted, however, that in that area time has no bearing on ground covered.

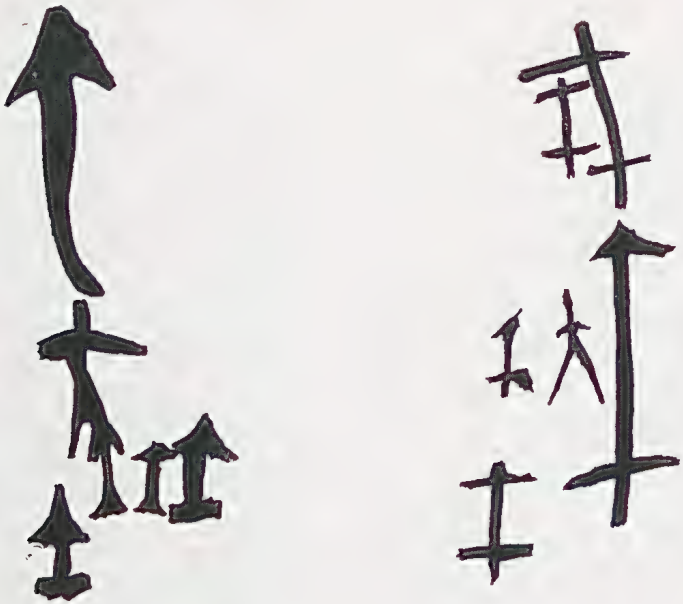
We were, nevertheless rewarded by finding Honeysuckle Creek Shelter No. 3, an unrecorded shelter. This is a commodious overhang, facing east, and completely protected from the sun, but not apparently protected from the same agency which is probably responsible for most of the splitting and flaking of the rocks in the locality—sudden and extreme changes in temperature. The surface of the rock in this shelter, therefore, suffers from the same affliction as No. 1; it has almost entirely flaked off, and with the flaked layer went the paintings. All that is left now is what could have been the outline of two human feet in red ochre. Only ten toes and the right side of the right foot remain, but it is enough to show that the feet were about 12 inches long. There was at least one other painting there, because the upper edge of one large flaked section shows a red stain about 12 inches long; but what it was part of, is anybody's guess.

The importance of this extension to the Cultivation Creek Lizard centre does not only lie with the finding of the human foot outline, although this is the first time this design has been reported from Victoria. But meagre as

* Mr. Ian McCann, of Stawell, and myself.

the results of such fatiguing searching has been, it has widened the area in which "lizards" occur, and increased the locations in which rock shelters were painted. This, in itself, is knowledge gained.

And, who knows what may yet be found in that area?



(continued from page 262)

deny scientists access to data which might be of value in completing man's picture of the evolution of this continent and its natural phenomena.

Thirdly it would destroy the sanctity of the concept of a national park, which, once set aside, should be preserved in its natural condition for generations which come after us.

Therefore, and in view of the possibility of sources of power such as nuclear energy becoming available within a generation to satisfy foreseeable social needs, we call upon the Tasmanian Government to abandon the project of damming the Serpentine and other rivers in such a way as to damage any portion of a national park, a nature reserve, or any area which after proper investigation should be preserved as such, even though not already so constituted.

We also urge the Australian Conservation Foundation to add its influence and prestige to that of such notable individuals as Sir Edmund Hillary and Mr. Peter Scott, in inducing the Government of Tasmania to stay its hand, and thus earn the respect of those great numbers in our community who value the concepts for which we tonight express our support.

Notes on the distribution of the dune-snail *Theba pisana* Müller at Portsea Back Beach, Victoria

BRIAN J. SMITH*

Introduction

During recent field work on *Theba pisana* at Portsea Back Beach, in connection with other work on the snail, it was noticed that its distribution was extremely discontinuous. Certain areas had a very high population density while adjacent areas, seemingly similar in every particular, were completely devoid of snails. It was therefore decided to do a complete survey to try to correlate this distribution to other variable factors in the environment.

Theba pisana Müller is an introduced species, being originally described from Europe where it occurs in large numbers in coastal sand-dune areas. It is widespread in the coast-dune areas of southern Australia where it appears locally in very great numbers.

Methods

Maps in the Base Map Series—Mornington Peninsula Area Numbers 83, 84 and 103; scale 400 ft. to 1 inch with 10 ft. contours, were obtained of the area, and marked off in numbered strips at right angles to the coast; equivalent to strips 200 ft. wide on the ground. Using the easily recognizable feature of London Bridge as a starting point, stakes were placed 200 ft. apart along the beach. Measurement was by a previously calibrated rope, the line being kept parallel to the coast by eye. From these points the direction of the strip boundary-lines was determined by compass bearing, the results being confirmed by comparing the topography with the map. The final position of boundary lines of each strip was agreed upon by the entire party—six persons. Each strip was then searched thoroughly by two people working as a team to a distance of from 1,000 to 1,500 ft. from the beach. The position of any snails found was noted on a map, and a small soil sample and a sample of all plants on which the snails were found at that point were collected. In regions where no snails were found, soil and plant samples were taken periodically at the discretion of the teams. Density of snails was noted qualitatively for each position.

Plant samples were dried in a press, and identified by the National Herbarium.

Distribution of Snails

The distribution of snails is shown in Fig. 1. The density of snails in the areas where they occurred was classified as abundant, to very abundant, in the vast majority of cases. In the areas where no snails were recorded, no evidence of a past population, such as the presence of dead shells, was recorded either.

No correlation could be seen between the distribution of snails and the height above sea level or direction of slope of the ground. In the study area the distribution of snails always stopped short of the maximum distance of the search from the beach.

From other work in the area, counts of from 100 to 150 snails per square foot of vegetation were noted for some areas. In the present study it was noticed that at the very edges of the mapped ranges the population

* Curator of Invertebrates, National Museum of Victoria.

contained a relatively greater number of large snails with very few snails being observed in these areas.

Distribution of Plants

The plant species on which snails were found aestivating, and in some cases probably feeding, are listed below. Also listed below are three species of plant which were notable for the absence of snails in areas where snails were abundant. However, no further inference can be drawn from this observation without a more extensive study.

The plant species associated with the snails were however not confined to the areas where the snails occurred. No correlation could be found between the distribution of any plant species or group of species with the distribution of snails. One point worthy of note is that the majority of plant species associated with snails are Australian native species. This indicates a large degree of flexibility in the habits and food preferences of this introduced snail species.

Soil Samples

The soil samples from various areas showed little or no differences which could be correlated with the distribution of the snails. A coarse sandy soil occurs throughout most of the area, the only variation being that in the denser scrub, the soil is black in colour and has a higher organic content. No snails were found in this area, but were confined to the sand dunes. However, there were large tracts of sand dunes without snails.

Discussion

From the results presented above, it is seen that the easily observable discontinuous distribution of *Theba pisana* cannot be correlated with distribution of plants, soil types, prevailing wind, or any other natural phenomenon. However, there is a very strong correlation between the distribution of the snail, and the areas heavily and fairly constantly used by man. It can be easily seen from the map (Fig. 1), that the snail is confined to the area immediately surrounding car parks, and well established sealed and unsealed access roads and areas, such as those surrounding the surf beaches at Portsea and Sorrento. These of course, are constantly frequented by people. A similar distribution relationship was noted for *Helicella virgata* in South Australia by D. Pomeroy 1966 (pers. comm.).

The only reasonable explanation of this, is that this snail is dispersed almost entirely by the aid of man; that it has practically no dispersal powers of its own. Its distribution in this area contrasts surprisingly with *Helix aspersa* and *Cochlicella acuta,* both of which occur at a much lower population density right throughout the area. It is to be supposed that *Theba pisana* was originally brought in by man, and that the population increased at this point of entry. They were then dispersed by man throughout the area which he frequents regularly. A comparison of the population factors, both behavioural and ecological which bring about these differences in distribution of *Theba pisana* and *Helix aspersa,* would make an interesting topic for investigation in the future.

ACKNOWLEDGEMENTS

I wish to thank the technical officers from the Department of Zoology and Comparative Physiology, Monash University, Clayton, Victoria, for their assistance in the field work. They are Miss S. Dawborn, Miss E. Russell (Johns), Mr. F. Hercus, Mr. R. Gladwin and Mr. P. Domelow. I also wish to thank Miss Ashton of the National Herbarium for identifying the plant specimens.

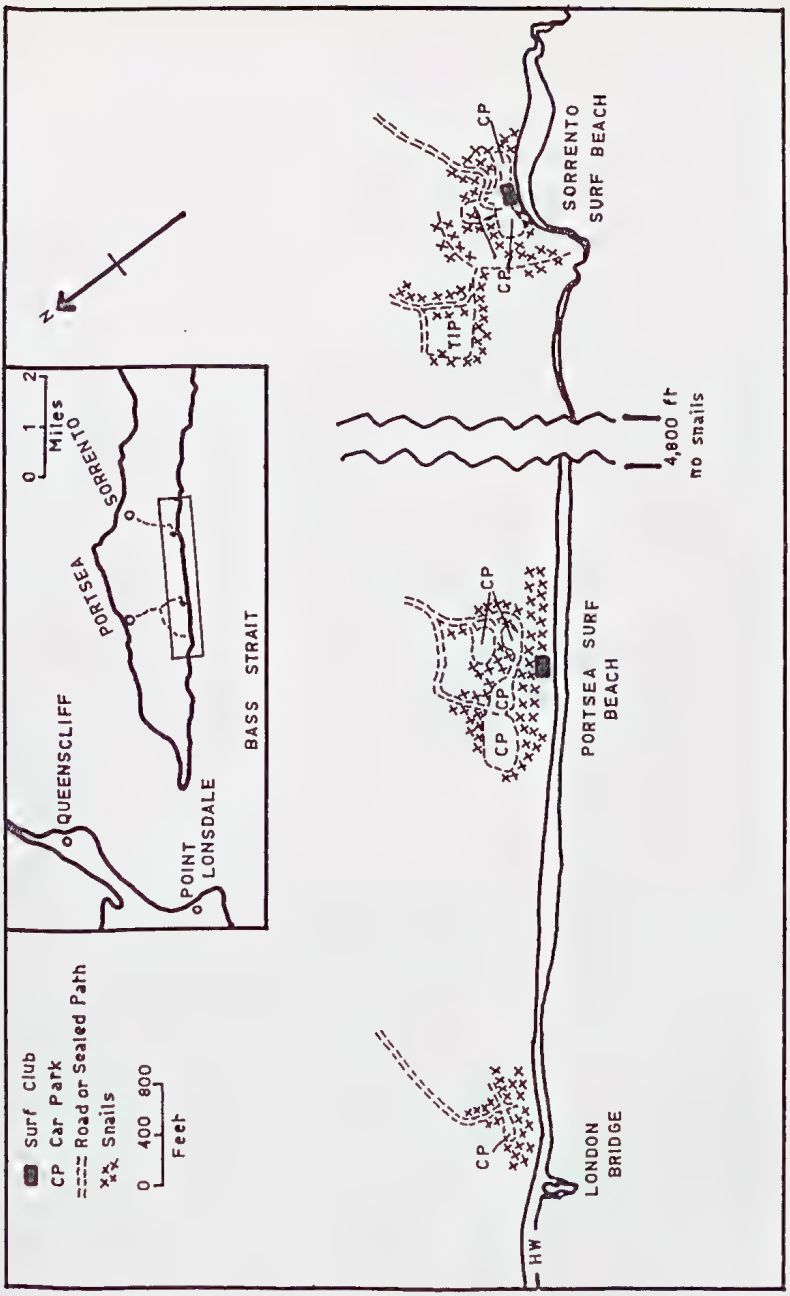


Fig. 1. Map showing the distribution of the sand-dune snail *Theba pisana* in the Portsea Back Beach area. The inset shows the position of the study area on the Mornington Peninsula.

Plants on which snails were found, and in most cases were probably feeding:

Bryum billardieri	a moss	
Monocotyledons		
Ammophila arenaria L	marram grass	Europe
Asparagus asparagoides L	smilax asparagus	Europe
Ehrharta longiflora	annual veldt grass	South Africa
Gramineae		
Spinifex hirsutus	hairy spinifex	Aust. native
Dicotyledons		
Acaena anserinifolia	bidgee-widgee	Aust. native
Apium prostratum	sea celery	Aust. native
Calocephalus brownii	cushion bush	Aust. native
Carpobrotus aequilaterus	angular pigface	Aust. native
Clematis microphylla	small leaved clematis	Aust. native
Correa alba	white correa	Aust. native
Emex australis	spiny emex	Aust. native
Euphorbia peplus L	petty spurge	Europe, Asia, Africa
Leptospermum laevigatum	coast tea-tree	Aust. native
Leucopogon parviflorus	coast beard-heath	Aust. native
Lycium ferocissimum	african boxthorn	South Africa
Lycopsis arvensis L	bugloss	Europe, Asia, Africa
Medicago hispida	rough medick	Europe
Melaleuca pubescens	moonah	Aust. native
Muehlenbeckia adpressa	climbing lignum	Aust. native
Myoporum insulare	boobialla	Aust. native
Olearia axillaris	coast daisy-bush	Aust. native
Pimelea serpyllifolia	thyme rice-flower	Aust. native
Rhagodia baccata	seaberry saltbush	Aust. native
Senecio elegans L	purple groundsel	South Africa
Senecio odoratus	scented groundsel	Aust. native
Senecio mikanioides	cape ivy	South Africa
Sonchus megalocarpus	dune thistle	Europe
Sonchus oleraceus L	sow thistle	Europe
Tetragonia implexicoma	bower spinach	Aust. native
Threlkeldia diffusa	wallaby saltbush	Aust. native
Zygophyllum billardieri	coast twin-leaf	Aust. native
Plants without snails		
Beyeria leschenaultii	pale turpentine-bush	Aust. native
Lobularia maritima	sweet alice	Europe
Parietaria debilis	forest pellitory	Aust. native

Quartz Crystals from the Strathbogie Ranges

By Don Dangerfield

In the north-east of Victoria, Between Tolmie and Benalla, lie the Strathbogie Ranges. To many readers, this name no doubt brings to mind the exploits of the bushranger Ned Kelly.

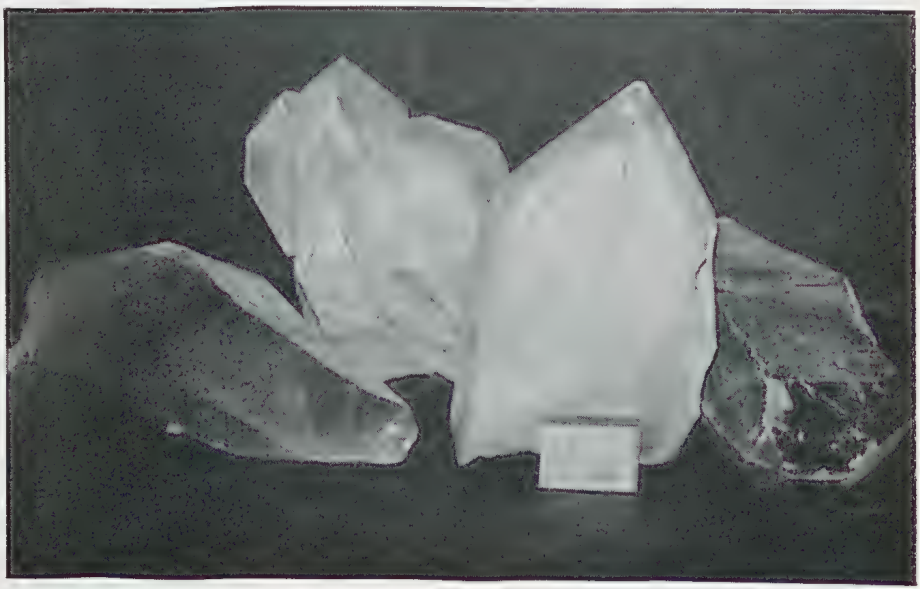
However, these ranges have also an important association with at least two branches of natural history. Many species of fauna inhabit the area, and the geology of the locality is particularly interesting. It is to the latter that the subject matter of this article is devoted.

Near the Crystal King Mine, Mervyn Doherty and myself have established a claim called the A-Day Mine. We enter from the Barjarg turn-off from the Mansfield Road, and leave this when approximately a quarter of a mile beyond a Forest Commission hut named "Honeymoon Cottage".

Here, one can camp comfortably, for the hut is rain proof and provides a fireplace. I have found this hut very useful during winter visits to the mine.

The geology of the immediate vicinity exhibits a coarse-grained biotite granite, with porphyry containing quartz and large felspar crystals. These crystals occur in the area over which we have our claim.

The color of the quartz crystals varies from smoky-grey to brown, and some have inclusions which indicate that the crystals have grown on the spot in which they are found. They



weigh from 1 lb to 50 lb, the larger specimens being well terminated.

One practical application of the quartz crystals is in radio transmitters and power stations, where accurate frequency control has to be maintained.

We find the crystals not in the pipes, as advised by some, but in the walls of the shaft. These are of decomposed granite, containing some fine crystals of quartz and tourmaline, together with a white material like magnesite. Intending gem-hunters should be careful on entering these mines, because of the possibility of the side walls sliding.

Occasionally, crystals may still be found on the surface adjoining the mines; however "rock-hounds" in their search have turned over most of the "dumps". About 10 years ago, we did find on the surface, some large crystals which had been discarded by miners; but visitors should now be prepared to dig in the proximity of the mines.

NOTES:

1. Do not enter on to any claim, without having first obtained permission from the owner.
2. If using the fireplace in the Forest Commission hut, make sure that the fire is quite extinguished before leaving.
3. The main road is of good gravel, but the side roads are impassable in winter to any except four-wheel-drive vehicles.

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Whales and Dolphins Recorded for Victoria

By N. A. Wakefield*

Iredale and Troughton (1934) listed thirty-one species of whales and dolphins as having been recorded in Australian waters. Of these, only four were credited to Victorian seas. At the same time, thirteen species were recorded for New South Wales, sixteen for Tasmania, and twelve for South Australia.

Brazenor (1950) included seven species in his treatment of Victorian mammals.

The paucity of records of cetaceans in Victorian waters has evidently been due, not to lack of the animals themselves, but to the circumstances that, until very recently, no local person has been much interested in this aspect of our wildlife.

The situation has been remedied to some extent during the past five years by work of officers of the Fisheries and Wildlife Department of Victoria. Warneke (1963) published some additional records, and the Department has in hand certain data which are to be published in due course.†

In addition, the following records and comments are presented, as a contribution to published knowledge of the members of the order Cetacea that visit, or have visited, seas along the Victorian coastline.

* Monash Teachers' College, Clayton, Victoria.

† I have been permitted to note briefly two species records from these data—those acknowledged to "F.W.D."—so that the present article includes mention of all sixteen cetaceans that can now be credited to Victoria.

WHALEBONE WHALES
(Suborder Mysticeti)

Right Whales (Family Balaenidae)

Southern Right Whale

Eubalaena australis

Portland Bay, south-western Victoria, was a centre of "bay whaling" from about 1828 onward (Dakin, 1934). The Right Whale was one of the two kinds that commonly frequented the Bay (Dunderdale, ?1898), but its numbers were so depleted that the species has been on the verge of extinction for many years. Gaskin (1964) notes that there is some evidence that Right Whales may be returning to Australian waters, as well as those of New Zealand. To date, there appears to be no Victorian record of the species in scientific literature.

In the newspaper, *Portland Observer*, 23/7/1942, B. E. Carthew, a local naturalist, described the observation "a few days ago" of a whale, estimated to be 40 to 50 feet long, at the Portland pier. No suggestion was made as to the species, but certain features of the description identify it as *Eubalaena australis*. Carthew noted "at the front of its forehead" a protruberance "about three times the size of a large dinner plate", which is unquestionably the diagnostic "bonnet" of the Right Whale. He noted too the flat back (described as "table-like")

and unhurried movement, which are also characteristic of the species.

Pigmy Right Whale

Caperea marginata

Figure 1 is a photograph of a whale which was stranded in the vicinity of Portland. The photographer, B. E. Carthew, is not certain of the data but believes that the stranding took place at Ainstree's Beach, Portland Bay, in 1946 (pers. comm., 1967). He obtained two baleen plates from the specimen, one of which is now lodged in the National Museum of Victoria.

The plate is 19 inches (82 cm) long, yellow in colour with a narrow black outer margin and a fringe of long pale hairs up to 4 inches (10 cm) long. These features of the baleen are diagnostic of *C. marginata* (ref. Barnard, 1954). The photograph also illustrates the "bow-head" shape of the jaws, the large white tongue, and the absence of rorqual throat grooves.

There is no previous record of the Pigmy Right Whale for Victoria, though Davies and Guiler (1957) list records of it for Tasmania, South Australia and Western Australia, as well as for New Zealand, South Africa and Chile.

RORQUALS (Family Balaenopteridae)

Blue Whale

Balaenoptera musculus

Brazenor (1950) stated that "the inclusion of this animal in the Victorian fauna rests upon a specimen washed ashore at Jan Juk, outside Port Phillip Heads, in 1867. It measured 90 feet in length." This is the specimen which was named *Physalus grayi* by McCoy (1867), who described it as a "finner", 90 feet in length and with the baleen black in colour. The time of stranding was, in actual fact, the winter of 1866 or 1865 ("last winter" in McCoy's original notes of 1866).

Iredale and Troughton (1934) placed McCoy's "species" in the synonymy of *Balaenoptera physalus* (the

FIG. 1

Pigmy Right Whale, Portland area, ?1946. (Note: The baleen has been removed.)

Photo: *B. E. Carthew*

FIG. 2
Blue Whale, Anglesea, 1955.

Photo:
By courtesy, *The Age.*

FIG. 3—Remains of Blue Whale, Portland Bay, about 1957. (Note the black baleen.)
Photo: *B. E. Carthew*

Finback Whale) and so recorded the species for Victoria.* Subsequent authors (e.g., Hershkoritz, 1966) have accepted this synonymy. However, as Brazenor evidently recognized, the 90-foot length and the black baleen are diagnostic of *B. musculus,* and it is to this species that *Physalus grayi* must be equated in synonymy.

In April 1955, a Blue Whale was stranded at Anglesea, 50 miles southwest of Melbourne. The photographic print which is reproduced in Figure 2 is in the files of *The Age* newspaper, Melbourne, and a note on it gives the length of the specimen as 70 feet. The identification has been made by D. E. Gaskin (pers. comm., 1967), who notes that the dark blotched belly is diagnostic of *B. musculus,* and he comments further that, judging by the girth, 55-60 feet would be a more likely estimate of the length.

In 1957 or thereabouts, a Blue Whale was stranded at the mouth of the Fitzroy River, which empties into Portland Bay. The specimen is identified by the black baleen, which is conspicuous in Figure 3. The photo-

* There is no authentic record of the Finback Whale for Victoria. However, there are two unpublished records for South Australia (P. F. Aitken, pers. comm., 1967).

grapher, B. E. Carthew, gives the length as 60 feet. The major part of a cranium, presumably of this whale, is lying partly buried in sand on the east side of the Fitzroy estuary. The width of the skull was originally 8 feet (2.4 m.) and the length something in excess of 15½ feet (4.7 m.).

Minkie, or Piked Whale

Balaenoptera acutorostrata

The photographs reproduced in Figure 4 were taken by T. Newton of Portland at Allistree Beach, Portland Bay, on October 13, 1946. He states (pers. comm., 1967) that the specimen was "6 to 7 feet long", and the comparative size of the foot-print in the upper photograph confirms the small size.* Throat grooves are obvious in the illustration, and a rorqual of this size can only be a very young calf of *B. acutorostrata,* which is the smallest member of the balaenopterid family. The dark back, white under-parts, slender head, and light-coloured baleen, are characteristic of the species.

The Minkie has not been recorded previously for mainland Australian waters. However, Davies and Guiler (1958) recorded that, in early June 1957, at Lewisham in Tasmania, there was a 7-foot specimen that had been stranded four to six weeks previously. They commented on the small size of the specimen, presumed to be newly born, and on the value of the record as an indication of the species' breeding season. It is interesting therefore to note that a calf of similar size was stranded near Portland in mid-October.

Humpback Whale

Megaptera novaeangliae

In issues of the newspaper *Portland Guardian,* dated 2/9/1843 and 28/9/1844, there are lists of numbers of whales caught in Portland Bay during the past seasons. The only ones

* A report which appeared at the time in the *Portland Observer,* accompanied by an indistinct photograph evidently of the same animal, gave the length as 15 feet, but it appears that there was some confusion with the specimen shown in Figure 1, which was stranded in the same area about the same time.

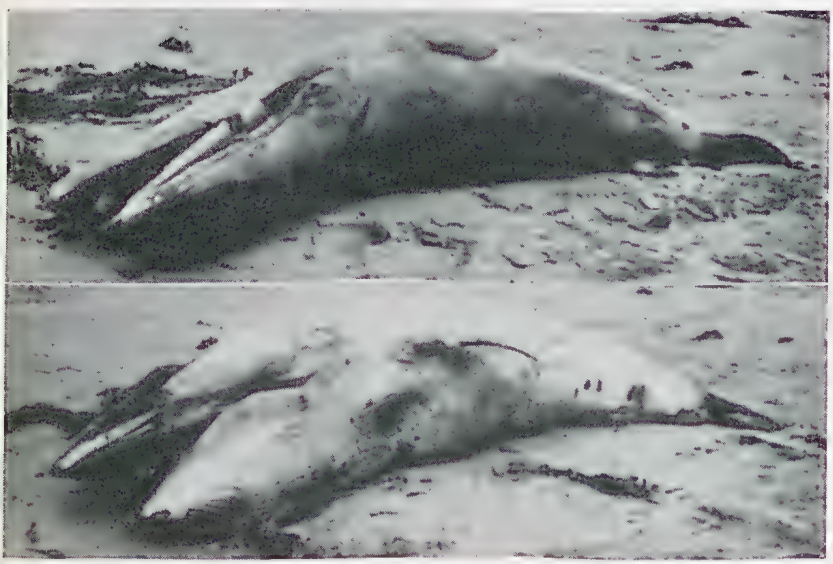

FIG. 4
Minkie Calf, Portland Bay, October, 1946.

Photos: *T. Newton*

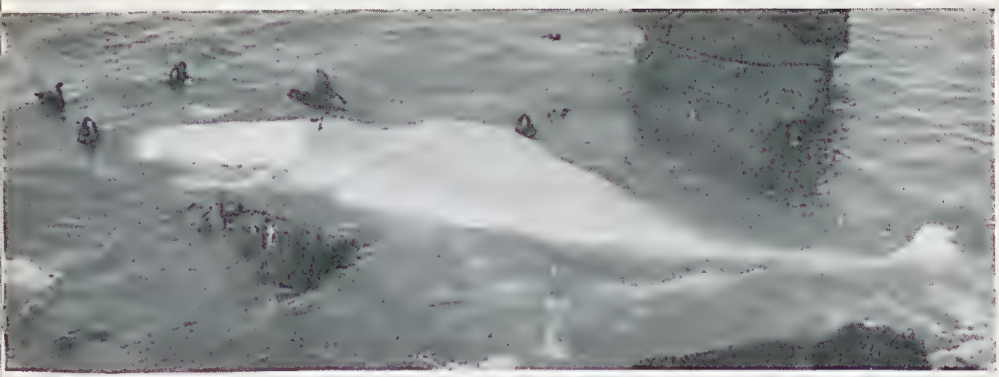

Photo: *B. E. Carthew*

FIG. 5—Sperm Whale and Giant Petrels, Nelson Bay, 1954.

specifically identified are two "humpers" taken on 30/6/1843 and 25/7/1844 respectively. In an issue of the same newspaper, dated 20/6/1859, there is report of a Humpback which was harpooned but escaped, in Portland Bay on 20/6/1859.

Brazenor (1950) states that "there are several records of this whale being stranded on the Victorian coast". There appear to be no museum specimens or published data to support this statement, and Barnard (1954) states that "they very rarely get stranded". If the "several records" were based on local reports, it should be noted that Bass Strait fishermen apply the name "Humpback" to the Sperm Whale.

Chittleborough (1965) illustrates the northern migration routes of different populations of the species along the east coasts of Tasmania, New South Wales and Queensland, and along the west coast of West Australia, and he records the sighting of one specimen at the head of the Great Australian Bight (by J. A. Calaby, 3/8/1952) and of another in St. Vincent's Gulf, South Australia (winter, 1961). Jones (1925) notes that "a specimen of this whale was stranded at Corny Point, Yorke Peninsula, and its skeleton is preserved in the State Museum" (i.e., of South Australia).

TOOTHED WHALES
(Suborder Odontoceti)

SPERM WHALES
(Family Physeteridae)

Sperm Whale

Physeter catadon

Remarkably enough, this species has not before been recorded for Victoria in scientific literature. It is the second species noted by Dunderdale as frequenting Portland Bay early last century, and Learmonth (1934) refers to a "sperm harpooned off Fitzroy River in 1837".

A 48-foot specimen was stranded at Bridgewater Bay, west of Portland, in 1944. It was photographed by J. R. Adamson of Portland, and a picture was published in *Wild Life* magazine, Melbourne, in October 1944 (Vol. 6, p. 315) but without identification. Adamson (pers. comm., 1967) states that a tooth of the animal was sent to the late David G. Stead of Sydney, who "confirmed that it was a Sperm Whale". The specimen eventually decomposed and yielded two lumps of ambergris weighing 43 and 23 pounds respectively.

A further Victorian record is provided by the specimen shown in Figure 5. It was photographed at Nelson Bay,

a few miles southerly from Portland, on 19/7/1954, by B. E. Carthew. The length appears to be somewhat less than 40 feet.

Large whales, often accompanied by calves, are commonly seen along the Victorian coast in late autumn and winter. Specimens have been observed by local residents off Port Campbell, at Port Fairy and in Portland Bay, during 1966 and 1967, for example. Port Fairy fishermen, though referring to them as "Humpbacks", are quite emphatic that they have the head shape and lower jaw which are typical of the Sperm Whale. This is the identity which one would expect, for the species is the only one of the world's great whales that is not now rare (ref., McVay, 1966).

Pigmy Sperm Whale

Kogia breviceps

Although there have been many records for other states (e.g., Hale, 1962), no Pigmy Sperm Whale has been recorded to date for Victoria.

The specimen shown in Figure 6 was photographed near Cape Bridgewater, west of Portland, by K. J. Kittson, a local resident, on 11/5/1958. The length was noted as "10-11 feet".

An earlier stranding of a specimen of *Kogia* occurred at Shoreham, central Victoria, about May 1954. D. Wiseman, Merricks North, has provided the following data about the specimen (pers. comm., 1967):

"The bottom jaw finished quite a long way back from the nose, which was round. The jaw had a narrow angle and a real picket fence of teeth, evenly spaced. The teeth would have been about one-sixth inch diameter and nearly an inch long, perfectly round and finishing in a blunt point. Teeth 10-12 on each side. It was creamy under the jaw and chest, dark olive-brown elsewhere. Length about 8 feet, the body quite cylindrical."

Handly (1966) distinguishes *Kogia simius* from *K. breviceps*, crediting the former with an adult length of 2·1-2·7 m. (7-9 feet) and 8-11 (rarely 13) pairs of teeth, compared with an adult

FIG. 6
Pigmy Sperm Whale, Cape Bridgewater, May 1958.

Photo: *K. J. Kittson*

Photo: *S. Archer* (print by courtesy *The Age*).
FIG. 7—Strap-tooth Whale, Anderson's Inlet, 1955.

length of 2·7-3·4 m. (9-11 feet) and 12-16 (rarely 10 or 11) pairs of teeth in the latter. If this classification is accepted, the length of the Cape Bridgewater specimen indicates that it was *Kogia breviceps*, while the Shoreham specimen could have belonged to either species.

BEAKED WHALES (Family Ziphiidae)

Scamperdown Whale

Mesoplodon grayi

A National Museum specimen from Cape Schanck, central Victoria (July 1931) was recorded by Warneke (1963). This had been mentioned previously, without data, by Brazenor (1950), who erroneously depicted the species as having a large protruding tusk as in the male Strap-tooth Whale.

Strap-tooth Whale

Mesoplodon layardii

A female specimen, stranded near Port Fairy in June 1962, has been recorded and described by Warneke (1963).

Figure 7 pictures a whale which was stranded at Anderson's Inlet, S.E. Vic., about February 1955. The photographer states (pers. comm., 1967) that the length was 15 to 20 feet but recalls no other details. He states also that the photograph was published in the Melbourne newspaper, *The Argus*, but this has not been traced.

The shape of head and fin identify the specimen as a ziphiid. It was lying with its back towards the photographer, and the extruded tusk is that of a male of *Mesoplodon layardii*.* The colour pattern also appears to be the same as in the Port Fairy specimen illustrated by Warneke.

Cuvier's Beaked Whale

Ziphius cavirostris

Mallacoota, E. Vic.; September 1964 (F.W.D.).

Bottle-nosed Whale

Hyperoodon planifrons

Two photographs were published in *Wild Life* in August 1950 (Vol. 12, p. 373) of an 18-foot specimen stranded at Cape Bridgewater, S.W. Vic. The editor tentatively identified it as *Mesoplodon grayi*, but Warneke (1963) has suggested that it was a Bottle-nosed Whale. A third photograph of the same specimen has been supplied by K. J. Kittson, and this confirms that the animal was, in fact, a male of *H. planifrons* (Figure 8). The

* McCann (1962) notes that the strap-shaped male tooth reaches 300 mm. in length and 62 mm. in width (= 12 x 2½ inches). Judging by its dimensions compared with the length of the animal, the extruded tooth in Figure 7 is apparently 7 x 2½ inches. As it is foreshortened in the photograph, the actual length would have been considerably more than 7 inches.

head shape and the tooth at the end of the lower jaw are diagnostic. Both D. E. Gaskin (pers. comm., 1967) and C. McCann* (pers. comm., 1967) have examined and identified this photograph.

GREAT DOLPHINS
(Family Globicephalidae)

Killer Whale

Orcinus orca

In the National Museum of Victoria there is a jawbone of *Orcinus* collected near Wilson's Promontory lighthouse in 1933. Bass Strait fishermen are familiar with the Killer, which is, as stated by Brazenor (1950), "not uncommon in the coastal waters of Victoria".

False Killer

Pseudorca crassidens

Rosebud, Port Phillip Bay; 23/6/1965 (F.W.D.).

Pilot Whale

Globicephala melaena

Schools of Pilot Whales, and single individuals, are often stranded on eastern Australian shores.

A large number came ashore at Mann's Beach, near the western end of the Ninety Mile Beach, eastern Victoria, in March 1964. Photographs of the occurrence were published in *Wild Life* in June 1946 (Vol. 8, pp. 195-8).

In *The Age*, 25/11/1957, there was a report, with photographs, of a mass stranding at Port Welshpool, E. Vic.

In January 1967, a male specimen was washed ashore four miles east of Port Campbell, S.W. Vic. (Figure 9). A local newspaper (*Cobden Times*, 11/1/1967) reported that it was 22 feet long.

DOLPHINS (Family Delphinidae)

Common Dolphin

Delphinus delphis

Schools of these dolphins are commonly observed from ships and small craft in Victorian waters. Specimens in the National Museum are from Hobson's Bay (registered, 1879) and Port Welshpool (1926).

Bottle-nosed Dolphin

Tursiops truncatus

This species is frequently seen in Victorian waters. It is evidently the "grampus" of some Bass Strait fishermen, who describe it as twice the size of the Common Dolphin but with the same head shape. National Museum specimens are from Wilson's Promontory (1927) and Port Fairy (May 1967).

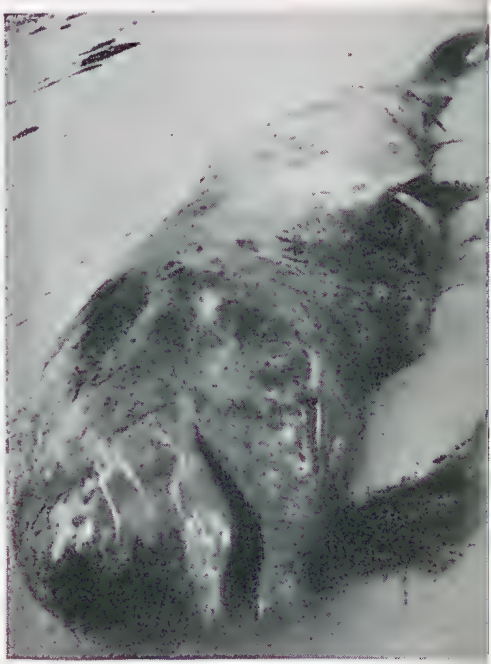

FIG. 8—Bottle-nosed Whale, Cape Bridgewater, July 1950.
Photo: *K. J. Kittson*

* Oceanographic Institute, D.S.I.R., Wellington, New Zealand.

FIG. 9
Pilot Whale, Port Campbell, 1967.

Photo:
P. Bartels (print by courtesy, F. Millar).

ACKNOWLEDGEMENTS

I wish to thank officers of the National Museum and of the Fisheries and Wildlife Department of Victoria for data which has been made available, the local observers who have provided reports of whale strandings and sightings, and the photographers who have permitted reproduction of their pictures. In particular, I am grateful to David E. Gaskin of Massey University Zoology Department, Palmerston North, New Zealand, for assistance with identifications, literature references, and the critical reading of a draft of this article.

REFERENCES

Barnard, K. H., 1954. *A Guide to South African Whales and Dolphins.* South African Museum, Cape Town.

Brazenor, C. W., 1950. *The Mammals of Victoria.* National Museum of Victoria, Melbourne.

Chittleborough, R. G., 1965. Dynamics of two populations of the Humpback Whale, *Megaptera novaeangliae* (Borowski). *Aust. J. Mar. Freshwat. Res., 1965,* **16**: 33-128.

Dakin, W. J., 1934. *Whaleman Adventurers.* Angus and Robertson, Sydney.

Davies, J. L., and Guiler, E. R., 1957. A note on the Pygmy Right Whale, *Caperea marginata* Gray. *Proc. Zool. Soc. Lond.,* **129** (4): 579-89.

Davies, J. L., and Guiler, E. R., 1958. A newborn piked whale in Tasmania. *Journ. Mamm.,* **39** (4): 593-4.

Gaskin, D. E., 1964. Return of the Southern Right Whale (*Eubalaena australis* Desm.) to New Zealand Waters, 1963. *Tuatara,* **12** (2): 115-8.

Hale, H. M., 1962. The Pigmy Sperm Whale on South Australian coasts, Pt. III. *Rec. S. Aust. Mus.,* XIV (2): 197-229.

Handley, C. O., jnr., 1966. A synopsis of the genus *Kogia* (Pigmy Sperm Whales), pp. 62-9, in *Whales, Dolphins and Porpoises,* ed. K. S. Norris. University of California Press, Berkeley.

Hershkoritz, P., 1966. *Catalog of Living Whales. Bull. Amer. Mus. Nat. Hist.,* No. 246.

Iredale, T., and Troughton, E. LeG., 1934. *A Checklist of the Mammals Recorded from Australia.* Australian Museum, Sydney.

Jones, F. W., 1925. *The Mammals of South Australia,* Part III. Government Printer, Adelaide.

McCann, C., 1962. Key to the Family Ziphiidae. Beaked Whales. *Tuatara* X (1): 13-8.

McCoy, F., 1867. On the Recent Zoology and Palaeontology of Victoria. *Ann. Mag. Nat. Hist.* (3), xx: 175-202. (Reprinted from Intercolonial Exhibition Essays, 1866.)

McVay, S., 1966. The Last of the Great Whales. *Scient. Am.,* **215** (2): 13-8.

Warneke, R. M., 1962. A Record of the Beaked Whale (*Mesoplodon layardii*) in Victorian waters. *Vict. Nat.,* **80** (3): 68-73.

Evolution of Shoreline Barriers

By Edmund D. Gill*

A young Greek named Anaximander stood up in the market place in Athens in the 5th century B.C. and stated "Change is the nature of things, all is flux, nothing stays the same, all things are in alteration, change is the nature of things". This view of the world was lost in the Middle Ages, when people thought of all things as static. The "everlasting hills" were thought always to have been there. The level of the sea was thought to have been ever constant. Human history was thought of as a pond, rather than as a river. In our own century we have come to expect change, we have come to look for progress, we agree with Anaximander that change is the nature of things. The process of change-over from a static view of things to a dynamic view of things has gradually extended into all areas of thinking, including the origin of the rocks and the history of the sea.

We now know that sea level is constantly fluctuating. It is dynamic and not static. It is always changing, but the disturbance of its level by tides and by meteorological conditions makes it hard for us to observe these changes. However, the evidence of shoreline morphology, the evidence from the analysis time tables, and the understanding of the variation in sea level as a function of change in the ice régime of the earth has brought us to see that sea level is dynamic. Now if sea level is oscillating, shoreline structures cannot be static, but must also be a function of dynamic processes. Shoreline sand dunes (or "barriers" as they are now generally called) are constantly changing, new ones being built and old ones modified or even destroyed. Morphologically, the only stable barriers are the fossil stranded dunes that have been lithified into rock, or anchored by vegetation. Although shoreline barriers (like other shoreline features) are liable to change, there is evidence that some barriers are old. Some in Victoria have existed for 5,000 years or more as is shown by radiocarbon dating. Also unconsolidated stillwater marine shell beds of this age, although readily eroded, have survived on the open coast for this period of time (e.g. at Seaspray in Gippsland), and so must have been protected by barriers that have existed for at least that long. This does not mean that the barrier has necessarily always been the same, nor does it infer that the barrier has always been in exactly the same place. It is suggested that the barriers that have protected these beds have themselves been mobile, accommodating themselves to changing meteorological conditions and changing levels of the sea. What is the rapprochement between evidence for longevity of barriers and evidence for their instability? It is suggested that they are constantly evolving, being destroyed in part and rebuilt—hence the lack of consolidation, and lack of secondary carbonates. It is suggested that they migrate to and fro with changes of sea level and hence barriers are found sometimes overlying shell beds, sometimes overlying soils, sometimes overlying former shore

* National Museum of Victoria.

platforms, and so on. This concept matches the mobility of sea level with a comparable mobility of shoreline structures. It provides a dynamic and evolutionary view of both sea level and shore lines.

Let us take an example. The Ninety Mile Beach in Gippsland, eastern Victoria, is an open-coast high-energy sandy beach. The tidal range varies from about six to ten feet; storms beat on the coast so that there is often high wind-energy as well as high wave-energy. All along this coast there is a barrier behind the beach, and there is an ample sand supply to maintain this barrier. Let us consider a cross section of the coast where it is simple in structure. At Seaspray, about a mile inland, there is an ancient coast which is approximately parallel to the present one. From the fossil cliff, swampy flats extend towards the sea, then comes the sand barrier, then a sandy beach, and the ocean. A large drain has been dug for two miles on the inland side of the barrier, from the village of Seaspray eastwards to Lake Reeve—a lake inside the barrier. The drain provides an excellent cross section and shows that below the swampy beds there are still-water marine shell beds which are stratified. Such beds must have been laid down below low water level. The top of these beds is now approximately six feet above low water level on the coast, so the sea must have been at least six feet higher relative to the sea than it is at present. Where tested, the shell beds pass underneath the sand barrier. Pieces of cemented shell bed are found on the ocean beach, and some distance off shore the fishermen report a reef, the nature of which has yet to be determined. It could be the site of an ancient barrier in that the beds are of stillwater marine facies. They must have been laid down behind an ocean barrier, because the geographic context in an open ocean sandy beach. There must have been protection for the waters in which those shell beds were laid down. In that the shell beds pass underneath the barrier, it can be concluded that the position of the barrier has changed since the shell beds were deposited. It was noted after a storm that cliffs up to twelve feet high occurred on the ocean side of the barrier. Where the sea had cut away the barrier, the sand was uncompacted. It can therefore be inferred that as a result of sea attack, the barrier is cut and then filled again according to the prevailing conditions. In other places there are juvenile soils in the barrier indicating that parts of it are relatively old. With this and other evidence it is possible to construct a concept of the barrier changing position with altering sea level and altering meteorological conditions—a dynamic and not a static concept of the barrier. With rising sea level the barrier would gradually migrate inland, and conversely with falling sea level it would migrate seawards. However, its continuity since mid-Holocene times (the date provided by radiocarbon assay for the shell beds) is assured, because otherwise these beds that can so readily be eroded would have been destroyed. As the site is an open high-energy coast, these beds would certainly have been rapidly removed if at any time the barrier had ceased to exist. There has therefore been a continuity of barrier, but with change of position and nature according to the prevailing conditions. Detailed boring, dating of the top and bottom of each shell bed, and dating of the various elements in the structure of the barrier could elucidate this story in some detail. For the present, attention is drawn to the dynamic nature of sand barriers.

Mobility of sea level is matched by mobility in shoreline structures.

Excursion to Batesford Sanctuary

T. H. Sault

On 18th June last, a party of nearly 40 F.N.C.V. members visited Batesford Sanctuary*, where they joined an excursion of the Geelong F.N.C. led by their President, Mr. Jack Wheeler. The 40 cars which conveyed the Geelong party to Batesford indicate the growing strength of that club. Mr. Wheeler met the F.N.C.V. at the entrance, and escorted them to the homestead—"Lilydale House"—where Mr. and Mrs. Belcher awaited with morning tea for both parties. This splendid property which has been in the Belcher family for over 80 years was gazetted as a Sanctuary for Native Game in 1938. The 208 acres consist mainly of open parklands, but has in the eastern sector a very dense cover of *Kunzea peduncularis* (Burgan). After morning tea, the party moved off under the capable leadership of Mr. Wheeler. Proceeding down the slope to the Moorabool River, the party stopped at a place where the Rainbow birds had nested earlier in the year; while overhead about a dozen Whistling Eagles circled together. Mr. Wheeler said this was not uncommon during the off-mating season. A little later a Brown Hawk glided swiftly above the tree-tops, and was soon out of view. The *Eucalypts* in the Sanctuary are either Red, Yellow or Manna Gums. In these, several Eastern Shrike-tits were seen. Their characteristic way of tearing the loose bark with their strong beaks in search of food, uncovered their presence.

Down at the river, an excellent example of *Correa glabra* was seen in bloom. Along the banks *Acacia melanoxylon* (Blackwood) was common, while a little higher up were the Lightwoods, *A. implexa.*

A halt was called, and the leader pointed out where the Jungle Weed (*Chrysanthemoids monolifera*) seemed to have taken control. He advised members to pull out the young plants as they saw them. Behind us, the dark deep pools of the river were the haunts of the Platypus and the Eastern Water Rat.

The party returned along the edge of the thicket of *Kunzea*, which gave cover to the many small birds of the area, as well as the Bronzewing Pigeons.

After lunch, the party moved along the higher ground, and soon had an exciting find—a Vegetable Caterpillar (*Cordyceps*); a fungus parasitic on the larvae of certain moths. In the same area other fungi were seen, including the dainty little Earth Stars.

The dull day was not favourable for observing many birds, but a pair of Jacky Winters and a pair of Scarlet Robins were seen. A Diamond Firetail was also seen by two members.

On the return to base, the many and varied specimens collected were exhibited. The one causing most interest, particularly among the young folk, being a young Whip Snake which was released later.

The party then assembled at the homestead where a wonderful afternoon tea was provided by the Belchers.

Mr. Wheeler, on behalf of the Geelong Club and members of the F.N.C.V. thanked Mr. and Mrs. Belcher for their wonderful hospitality. Mr. Wheeler was then thanked for his part as leader of the excursion.

* The Geelong F.N.C. has published a pamphlet on the Batesford Sanctuary, giving a complete list of the Fauna and Flora of the area. These are available on application to the Geelong F.N.C. Price 5 cents (plus postage).

Readers' Nature Notes and Queries

These columns are available for all members, young and old, to bring before others their own observations in nature. Correspondence may be sent to the Editor, 54 St. James Road, Heidelberg.

The Editor's file of Nature Notes is still very thin; please endeavour to refill it as soon as possible. Everyone, including the Junior Members is encouraged to contribute.

Thornbill Nesting Oddities

Mr. A. H. Chisholm, a former hon. editor of the *Vict. Nat.*, writes from Sydney:

In the nesting season that is "just around the corner", many observers will come upon the double-chambered nests of the Yellow-tailed Thornbill (Tomtit), and, no doubt, there will be renewed speculation concerning the purpose of the cup-shaped structure built above the side-entranced one that carries the eggs.

One old theory is that the "top storey" is the male bird's nightly restingplace. Another ascribes the purpose to deception of parasitic cuckoos and/or other possible intruders. More recently, it has been postulated that the open chamber is merely the outcome of the male bird's building urge.

Evidence to support any of these theories, or even of a new theory, would be welcome.

Certainly the urge to construct the subsidiary chamber is strong. For example, some years ago I found near Wattle Park (Melbourne), a nest so placed as to allow no room for the "attic" chamber, but, not to be thwarted, the builder had placed a small cup-shaped structure about 10 in. away. (See *Vict. Nat.*, May 1949, p. 17.)

Two other oddities come to mind:

In one case, a thornbill nest containing one egg was associated with a magpie nest carrying four eggs, but it was not, as is sometimes observed, actually attached to the larger nest, but was sited about a foot away—a fact that seems to shake the theory that certain small birds which attach their nests to the stick-built structures of larger birds do so merely as a matter of convenience. Moreover, the man who climbed the 15 ft. or so to the two nests surprised me by reporting that the thornbill product lacked the upper chamber.

My additional freakish nest of a thornbill, found near Maryborough, also caused surprise, because it was simply an open chamber, like that of a small honeyeater, and the four well-developed eggs could easily be seen.

That curiosity provided in fact something of a coincidence, for a few months earlier I had found, in the same district, a Mistletoe-bird's nest which was attached in two places to a slender branch. But, instead of having the usual side-entranced chamber, it was so thoroughly open as to allow an easy view of its two eggs.

It is difficult to suggest a reason for such odd occurrences. More broadly, it is difficult to conjecture why, among all our small birds that build domed nests, the Yellow-tailed Thornbill should be the only one to adopt an "attic".

Whether or not the habit has practical value, it should be remarked that the little Yellow-tail is, probably, the most abundant and widely-spread member of its group in the whole of Australia.

Encounters with Spiders

These interesting notes and observations come from Mrs. Ellen Lyndon, of Leongatha.

This happening took place at Swan Hill, by the Murray, in April of this year, and it seems worth recording.

We had pulled in by the riverside for an afternoon cup of tea in the shade, for the day had been pleasantly warm. The broad river lay calm and peaceful, patterned with the light and shade of the tree shadows. I went for a stroll along the bank to see what small adventure in the realm of nature might be there for the seeing. Honeyeaters were moving in the treetops and when watching for these another movement caught my eye.

From about fifteen feet up, above a clump of mistletoe in a red gum, a spider fell rapidly down on a thread of web and hung swaying gently in the sunlight. It appeared to be a Huntsman about half the size of an average adult and its whole attitude bespoke disturbance, even panic, although I could then see no cause for it. Suddenly it paid out more line and the air currents wafted it some twenty feet distant from its tree, on to a pathway. It landed running and set off at a great rate.

At this point a wasp alighted, a long-legged creature with shining blue body, and it began to prance along about a foot to the right of the running spider. The wasp made several feints at the spider before it attacked. A fierce struggle of flailing legs and wings ensued, before the spider collapsed into a limp bundle and the wasp prepared to lift the heavy body. After some effort it managed to rise above the grass and made a bee-line for the spider's tree, effecting a landing some four feet up the trunk. Straddling its victim it began the upward journey, hampered by the rough bark so that it was forced to tack back and forth, sometimes proceeding backwards, tugging valiantly. Suddenly it lost its grip and the spider fell and was lost in the tangle of rough weeds at the foot of the tree. No greyhound ever hunted a rabbit more assiduously than that wasp hunted for the crippled spider, nor did I offer any help, feeling slightly shocked by the whole savage drama. The little spider must have known it was doomed from the second that the wasp started it from its shelter under the bark of the tree. When I left it was still buzzing about in the grass thickets.

* * * *

When we are on the road and a meal-time comes around we begin to look for an interesting spot where we can browse while the kettle boils. Leaving Benalla in April the countryside was pretty dry. We were heading in the general direction of Mansfield and finally had to make do with a parched creek-bed that ran under the road. There were a few butterflies, females of the Common Brown, flitting through the dry grass, and birds appeared to be scarce. Compensation was there in good measure, however, as a search of the small thickets and trees in the gully showed a big population of spiders, most of them robust specimens of Nephila, the Golden Orb Weaver, whose permanent webs made our progress in between the bushes a most difficult matter. The webs were often edge to edge and sometimes a web had finished short to avoid encroachment on another's spread. In some cases the small males were present in the webs. This was an open spot, the roadsides were well timbered but the adjoining paddocks were cleared. One specimen only of the Golden Orb Weaver, Araneus, was found, a large female well camouflaged on the under side of a limb. This species destroys her web each morning and spins again at dusk or later.

* * * *

At Sawpit Creek camping park, near the headquarters of Kosciusko State Park, in N.S.W. in January of 1967, another spider came to our notice. It was a narrow black one, with legs extended to somewhere about an inch and a half. It wandered into the outbuildings during the night and when assisted outside with the broom it reared back in typical Atrax fashion, front legs waving and fangs pointing downward. On making enquiries of the ranger we found that this was indeed a member of the Atrax family but not the Sydney Funnel-web. These night prowlers are the small males, the female of the species remaining in her burrow. No one seemed particularly worried about them but I feel that here is a spider that should be treated with the utmost respect. They seemed to be fairly plentiful in the area.

Field Naturalists Club of Victoria

General Meeting—14 August 1967

With about 200 members present, the President, Mr. W. L. Williams opened proceedings.

The minutes of the July general meeting, having been read at the previous Council Meeting, were accepted on a motion from Messrs. Woollard and Allen.

The following announcements were made—

(i) From the General Committee for the Natural History Medallion, indicating that 25 nominations had been presented to the Award Committee.

(ii) Roy P. Cooper spoke of the current critical position of Victoria's only indigenous honeyeater, *Melaphega cassidix*.

He informed the meeting that 3000 reprints of his paper, "Is the Helmeted Honeyeater Doomed", which appears in the current issue of *The Australian Bird Watcher*, had been made available. 1000 of these had been supplied to the F.N.C.V. for distribution to selected people and organizations.

(iii) Mr. McInnes explained details of the arrangements for the preparation and supervision of the forthcoming Wildflower and Nature Show to be held at the Melbourne Town Hall.

(iv) The President informed the meeting that due to the financial position of the Club having been constantly under review by Council over the past months, it had been decided to hold a discussion at the September general meeting on the merits or otherwise, of an increase in subscriptions for 1968.

The speaker of the evening, Mr. Roger Riordan with his subject "Victorian Mountains", was introduced by the President.

The lecture was begun with some illustrations in colour of some general mountain scenery, covering that of the Grampians; Wilson's Promontory at Sealers' Cove, where the mountains meet the sea; Donna Buang, looking over Warburton; the Lake Mountain area: Suggan Buggan; Mt. Ellery, north of Orbost; the Strathbogie Ranges; and Mt. Hotham.

Mention was made of the Sardine Creek Post Office, near Talbotville in the Dargo area, where the Post Mistress, in order to keep the post office open, sent letters throughout Victoria so that sufficient replies were received to warrant the continuance of the office.

Among Mr. Riordan's favourite spots were the Dandenong Ranges, Mt. Buffalo, and the Cathedral Range near Taggerty—with the "Sugarloaf" being emphasized due to its potential as a rock-climbing area.

Some fine photographs of orchids from mountain areas were shown, and included a species of Calochilus; a Leek Orchid (compared in size with a pin's head); Caladenia sp.; Rabbit ears; and Nodding, Tall, and Bearded Greenhoods.

Various mountain streams such as the Snowy River, a stream in the Grampians, and the McKenzie River in Gippsland were illustrated, along with some of the associated vegetation of mountain streams, in the form of tree ferns at Cumberland and Tarra Valley. Some attractive fungi of the mountains were also included here.

From Echo Flat, north of Lake Mountain, and the nearest snowfield to Melbourne, some excellent slides of the wildflowers were shown. Among them were Richea, Daisies, Billy-buttons, Trigger Plants, Callistemon, and Gentians.

Also from the same area, some of the fauna was seen in the form of frogs, skinks, and a goanna. Some of the insects seen included a species of long-nosed Locust, Bull-ants, and a moth whose larvae attach their cocoons to the roots of mistletoe.

Mr. Riordan concluded his lecture by indicating some of the potential dangers to our mountain scenery. He first mentioned fires, but emphasized that in heath-lands, they may not be quite so permanently damaging as in mountain forests.

He also stressed the point that more ecological work should be carried out before "controlled burning" becomes a permanent feature of Forestry Department organization.

Logging operations have a damaging effect on landscape, as is evident in the Licola area; although there may be partial regeneration in time.

However, the speaker labelled the greatest danger as "Creeping Suburbia" with all its ancillary effects on landscape. He concluded by citing the case where a mother, who wished to grant a third of her 3 acre bushland property to each of her three children, would have to construct roads and clear the trees.

The President conveyed his thanks, on behalf of all present, for a most interesting and sobering lecture.

New Members as listed in the August issue of the *Victorian Naturalist*, were elected.

Correspondence was received from Mr. Robin Elks of Queensland, who indicated that his "Field list of Birds in the S.E. corner of Queensland", was now available. Details may be obtained from F.N.C.V. Secretary, Mr. D. Lee.

Mr. Eggleton, of the Ouyen F.N.C., wrote of the unfortunate temporary recession of the club owing to the departure from the district, of a number of previous members.

Mr. P. Sims, of the "Save the Lake Pedder National Park" Committee, sent a letter of thanks for the help given by the F.N.C.V.

It was moved, seconded and carried in response to a letter from the Photoflora Committee, that the club donate the trophy for the 1968 Competition.

Finally, correspondence from Mr. F. Barton of the *Snowy River Mail* in Gippsland, asked for the support of the F.N.C.V. in his request to the Government for a larger area than the 1000 acres already applied for, to be created a National Park near Cape Condron.

The only exhibit for the evening was a fungi from M. North. This was identified as *Lacterius deliciosis*.

Botany Group Report—10th August

Mr. B. Fuhrer took the chair and eleven members were present. Mr. R. Filson showed some colour-slides taken north of Alice Springs.

Some beautiful scenes were shown, including such places as Mt. Stewart, The Gap and the Gedda Gorge. Wildflower slides of the genera *Hibiscus, Cassia, Helipterum, Ptilotis* and *Calandria* were also screened.

Mr. J. Baines's topic was "Botany and the Australian History Medallion". He gave the names of twenty-five well-known naturalists and their nomination for the "Natural History Medallion". Mr. Baines then explained their various interests in natural history. Afterwards he spoke about the recipients of the medallion of past years and their outstanding work in natural history.

Mr. Baines mentioned each one of them and their particular interests. For example, Mrs. E. Colman, whose field of nature study was so comprehensive, and her contribution of hundreds of articles to the F.N.C.V. magazine, including her discovery of the pollination by an Ichneminid Wasp, *Lissopimpila*, to the Tongue Orchid, *Cryptostylis leptochila*. Mr. Baines also mentioned the poor write-up some of our Medallists of only recent years received.

Mr. Fuhrer thanked Mr. Baines for his interesting and unusual talk. After that, Mr. K. Kleinecke showed colour-slides of wildflowers of the European Alps.

A visitor, Mr. P. Uhlkerr, showed some orchid slides, these revealed slight differences in Maroonhood, *Pterostylis pedunculata*, of the same species photographed around Sydney and Melbourne.

Mr. Fuhrer showed some interesting colour-slides of fungi and lichen found in

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the Blackwood Ranges. Altogether it was a most enjoyable evening.

An excursion to Batesford (near Geelong) was arranged. The meeting-place will be Batman Avenue, at 9.30 a.m., on Sunday, 10th September, 1967 (private transport). This excursion should be very interesting.

Marine Biology and Entomology Group Report—August, 1967

Nineteen members attended this meeting, which was chaired by Mr. R. Condron.

Mrs. Strong spoke of some marine specimens collected from Ricketts Point by herself, Mr. G. Setford and Mr. Strong, for the forthcoming Nature Show. She said that owing to lack of suitable tides on appropriate days not nearly as much material has been obtained as was hoped for so far.

It was decided to have an excursion to Ricketts Point on Saturday morning, 26th August. In the afternoon Mr. Condron led an excursion to Doncaster to obtain pond life, also for the Nature Show. Members met at the Mont Albert tram terminus.

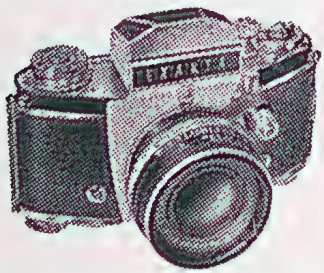
Mr. Condron introduced the guest speaker for the evening, Mr. H. B. Wilson, Senior Entomologist, Burnley Horticultural Gardens, his subject being "Introduced Insects". This proved to be a most interesting and informative talk. Mr. Wilson posed such questions as "When does an introduced insect become an Australian insect?" He also gave us a comprehensive list, which proved to be quite formidable, of introduced insects. Methods of control, biological and otherwise, were elaborated on. Mr. Wilson was listened to with close attention; many questions were asked and a vote of thanks was moved by Mr. Strong.

EXHIBITS

Mrs. Strong showed the egg mass of a skate and also gave a short talk on the preservation of seaweeds.

Mr. Setford showed some insects which he had obtained from a gum tree. Mr. Wilson said that these were frog-hoppers: members of the Jassidae family. He also showed two pupae and an egg of the Wanderer Butterfly *Danaida plexippus*. Mr. Strong displayed the egg under low microscopic power.

Mrs. McInnes exhibited a species of larva, unidentified, which she had



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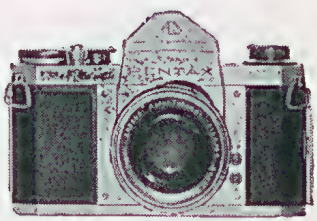

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taken from a tea-tree; it had spun a web around itself.

Mr. Condron showed a beautifully arranged collection of Australian butterflies and moths which will be displayed at the forthcoming Nature Show.

Geology Report—2nd August

Twenty-six members attended. Mr. Davidson occupied the chair in the absence of Mr. Dodds.

The subject for the evening was a talk given by Mr. R. Jackson of Yallourn on the brown coal deposits of the Latrobe Valley. The speaker opened his talk by saying that the brown coal measures of the Latrobe Valley constitute the largest deposits in the world. These are of Oligocene age, older than the Bacchus Marsh deposits and younger than the Otway deposits. The coal beds were laid down in a sub-tropic climate, the vegetation during that time being mostly of the Coniferous type. The principal one was Huon Pine, which together with Celery Top Pine now exists only in southern Tasmania. The beds, which lie on the flanks of Anticlinal and Monoclinal folds vary in depth: 200 feet at Yallourn to over 700 feet in other parts of the valley.

The amount of overburden varies also, and the removal of this is important from a commercial aspect. The Yallourn coal beds have overburden averaging 45 feet which is removed to areas already worked out. The Yallourn excavation has a perimeter of 8 miles, around which a road extends, its length being 9·5 miles. An average of 35,639 tons of coal per day is won of which 23,000 tons is used at the power station and 6,000 tons at the briquette factory. The largest dredge used in the extraction is a German chain bucket dredge weighing 2,200 tons, which removes 3,000 tons per hour and requires only two men to operate.

The coal is conveyed by a 49-mile electric rail system and to minimize the risk of fire a water system using 3,600 gallons per hour is maintained. The speaker gave many more facts and his unlimited knowledge of the area became evident to an appreciative audience.

Mr. Davidson moved a vote of thanks to Mr. Jackson for his excellent talk.

EXHIBITS

Miss Keedy—Slate Containing Chiastolite.

Mrs. Salau—Phosphate Rock, Ocean Island. Manganese Ore, Groote Island. Pyrrotite.

Mr. Davidson—Amethyst, Onslow, W.A. Thulite, Roebourne, W.A. Chrysoprase, W.A. Mookaite, Mooka, W.A. Prehnite, N.T. Jasperite, W.A. Dendritic Opalite, W.A. Mottled Magnesite, W.A.

Mr. Francis—Sphalerite, N.S.W. Wolframite, N.S.W. Chalcopyrite, Cassiterite, Tas. Galena, N.S.W. Gypsum, Blue Asbestos, N.S.W. Psilomelane, Groote Island.

Mr. Jackson—A specimen of Huon Pine from the coal beds polished, and presented to the Club.

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F.N.C.V. DIARY OF COMING EVENTS

GENERAL MEETING

Monday, 11 September—At National Herbarium, The Domain, South Yarra; commencing at 8 p.m.

1. Minutes, Reports, Announcements.
2. Correspondence.
3. Subject for the evening: "The Museum and the Community"—Mr. McNally.
4. General Business.
5. Nature Notes and Exhibits.

Monday, 9 October—"Something of the Fisheries and Wildlife Department's Philosophy on Conservation"—Mr. A. Dunbavin Butcher.

GROUP MEETINGS

(8 p.m. at National Herbarium unless otherwise stated)

Thursday, 14 September—Botany Group.

Wednesday, 20 September—Microscopical Group: C.S.I.R.O. Forests Products Laboratory at 7.30 p.m.

Friday, 30 September—Junior meeting at 8 p.m. at Hawthorn Town Hall.

Monday, 2 October—Entomology and Marine Biology Group Meeting at 8 p.m. in Mr. Strong's rooms in Parliament House. Enter through private entrance at south end of building.

Wednesday, 4 October—Geology Group.

Friday, 6 October—Junior meeting at 8 p.m. in Rechabite Hall, 251 High Street (north of Bell Street).

F.N.C.V. EXCURSIONS

Sunday, 10 September—Botany Group Excursion.

Sunday, 17 September—Yellingbo. The subject of this excursion will be the Helmeted Honeyeater and Mr. E. Hanks will be leader. The coach will leave Batman Avenue at 9.30 a.m. Fare $1.50. Bookings with the Excursion Secretary. Bring one meal and a snack.

26 December to 1 January—Portland. The coach will leave Melbourne on Boxing Day and remain with the party for day trips to be made in conjunction with the Portland F.N.C. Accommodation has been booked at a Portland motel for D.B. and B. and the cost, including coach, will be $52 per person. Bookings should be made with the Excursion Secretary, accompanied by $10 deposit (cheques to be made out to Excursion Trust).

Field Naturalists Club of Victoria

Established 1880

OBJECTS: To stimulate interest in natural history and to preserve and protect Australian fauna and flora.

Patron: His Excellency Major-General Sir Rohan Delacombe, K.B.E., C.B., D.S.O.

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Hon. Excursion Secretary: Miss M. Allender, 19 Hawthorn Avenue, Caulfield, 3162.

Hon. Sales Officer: Mr. E. R. Allan, c/o National Herbarium, The Domain, South Yarra, 3141.

Group Secretaries:

Botany: Mr. K. Kleinecke, 8 Oliver Street, Ashburton 3147 (25 2415).

Geology: Mr. R. Box, 19 Fulham Grove, Reservoir (47 5393).

Microscopical: Mr. M. H. Meyer, 36 Milroy Street, East Brighton (96 3268).

Fauna Survey: Mrs. R. Frankenberg, 36 Percy Street, Balwyn.

Entomology and Marine Biology: Mr. J. W. H. Strong, Legislative Council, Parliament House, Melbourne, 3002.

MEMBERSHIP

Membership of the F.N.C.V. is open to any person interested in natural history. The *Victorian Naturalist* is distributed free to all members, the club's reference and lending library is available, and other activities are indicated in reports set out in the several preceding pages of this magazine.

Rates for January-December 1967 are:

Ordinary Membership	$5.00
Country Membership (over 20 miles from G.P.O., Melbourne)	$4.00
Junior Membership (under 18 years)	$2.50
Subscription to the *Victorian Naturalist* (non-members)	$4.00

All subscriptions should be made payable to the Field Naturalists Club of Victoria and posted to Mr. R. L. Smith, 430 Little Collins Street, Melbourne, 3000.

Note: The currency of the present club year and Volume 84 of the *Victorian Naturalist* is from January to December, 1967.

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F.N.C.V. DIARY OF COMING EVENTS

GENERAL MEETING

Monday, 9 October—At National Herbarium, The Domain, South Yarra, commencing at 8 p.m.

1. Minutes, Reports, Announcements.
2. Correspondence.
3. Subject for the evening: "Something of the Fisheries and Wildlife Department's Philosophy on Conservation"—Mr. A. Dunbavin Butcher.
4. Election of New Members.
   (a) *Ordinary:*
   Mr. R. H. Anderson, Lot 66, West End Road, Warrandyte. (Interests—Native plants and birds.)
   Mr. R. Bolwell, Villa 5, 85 Grange Road, Toorak. (Interest—Animal Conservation.)
   Mrs. Olive May Dunn, 51 Grange Road, Alphington, 3078.
   Dr. Lois R. Fenna, 2 Rill Street, Heidelberg, 3084.
   Mrs. J. W. Stevens, 297 Albert Street, Brunswick. (Interests—Marine Biology and Botany.)
   (b) *Junior:*
   Miss Pamela Conder, 66 Rowell Avenue, Camberwell. (Interests—Mammals and Birds.)
   Miss Helen Dunn. (Interest—Botany.)
5. General Business.
6. Nature Notes and Exhibits.

GROUP MEETINGS

(8 p.m. at the National Herbarium, unless otherwise stated)

Thursday, 12 October—Botany Group. Dr. D. Ashton will speak on "The Flora of Wilson's Promontory".

Wednesday, 18 October—Microscopical Group.

Friday, 27 October—Junior Meeting at 8 p.m. at Hawthorn Town Hall.

Wednesday, 1 November—Geology Group.

Thursday, 2 November—Mammal Survey Group at Fisheries and Wildlife Department.

Friday, 3 November—Junior Meeting at 8 p.m. in Rechabite Hall, 251 High Street, Preston (north of Bell Street).

Monday, 6 November—Marine Biology and Entomology Group. This group meets at Mr. Strong's rooms in Parliament House at 8 p.m. Enter through private entrance at south end of building.

Thursday, 9 November—Botany Group.

F.N.C.V. EXCURSIONS

Sunday, 8 October—Botany Group excursion. Meet 9.30 a.m. at Batman Avenue. (Private transport.)

Sunday, 15 October—Anglesea. The coach will leave Batman Avenue at 9.30 a.m. sharp. Fare $1.80. Bookings with the excursion secretary. Bring two meals.

Tuesday, 7 November (Cup Day)—President's picnic to Macedon district. Leader: Mr. W. L. Williams. Fare $1.60. Bring two meals. The coach will leave Batman Avenue at 9 a.m.

26 December to 1 January—Portland. The coach will leave Melbourne on Boxing Day and will remain with the party for day trips to be taken in conjunction with the Portland F.N.C. Accommodation for the coach party has been booked for D.B. and B. at a Portland motel and the cost, including coach, will be $52 per person. Bookings should be made with the excursion secretary, accompanied by $10 deposit (cheques to be made out to Excursion Trust).

The Victorian Naturalist

Editor: G. M. Ward
Assistant Editor: W. White

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Front Cover:

The cover photograph was taken by Graham Pizzey, and is one of the many fine illustrations in his book, *Animals and Birds in Australia*.

The bird shown is the Australian Bustard, once very plentiful, but due to its value as a table-bird, it was shot ruthlessly in earlier days. The Fisheries and Wildlife Department is at present carrying out experiments in captive breeding of these birds at Serendip in Victoria.

Visit to Seal Rocks

By Eric Allan

The Department of Fisheries and Wildlife are conducting a research project into the habits and life cycle of the fur seals at Seal Rocks, about one mile offshore from the Nobbies on the south-west corner of Phillip Island; and on 27th May 1967, Garnsey Hooke and I, at the kind invitation of the director of the department, were able to accompany him on a visit to the rocks.

Owing to the difficulty and unreliability of landing by boat, we travelled across the short stretch of water by helicopter which gently landed on a rocky beach about centre of the rocks. As we walked from the helicopter we noticed a slightly pungent odour which was not at all unpleasant or overpowering. Walking around to the south side of the "heights" we ascended about 20 ft. to the flat plateau on which a hut has been erected. The plateau is covered in places with "pigface", this apparently being the only plant able to grow in this bleak exposed position.

It was high tide and in the seas around, swimming, leaping, playing and resting, were hundreds of seals. Their combined voices sounded very much like the noise of a large farmyard, for we could hear "moos", "baas", "quacks" and "barks"; with occasionally a noise like the farmer shouting at someone. With the waves crashing on the rocks, the wind whistling about us, and the seals in the seas around, it was most exhilarating.

The hut, erected by the staff of the Department is a comfortable place, with all essentials. These are very necessary, as the research being undertaken will last for at least five years. Considerable difficulties were experienced in erecting and equipping the hut, the major one being that only rarely can a boat go safely into the beach. With the advice and help of A.N.A.R.E., techniques and equipment used in the Antarctic were adopted, and two large inflated rubber rafts conveyed most of the required material to the rocks. While gulls

Seals and pups off-shore from the main island.

Photos by the author.

General view of seals on "Black Rock", an island off the main rock.

are nesting on the island, a helicopter cannot be used owing to the danger of the birds being hit by the rotor blades; but at other times a helicopter has conveyed many heavy or awkward items such as a refrigerator, gas stove, and table.

After lunch, the party walked around the beaches, at one place disturbing some pup seals, lying-up in a cave. They quickly "galumped" over the rocks to the sea, but not too fast for one to be caught, so that we could examine the metal tag fastened to the left upper flipper. During the breeding season the pups are measured, weighed, and given a registration number on a tag which is fastened to the flipper. Adult seals are branded.

We sheltered from a shower of rain and the cold wind in an observation box, two of which have been recently erected on the cliff edges overlooking the beaches used as rookeries during the breeding season, and from which it will be possible for a continual watch to be kept without disturbing the seals.

We retired that night with a lovely vista from our window of a small black rocky island on which reposed many recumbent figures, outlined in a moonlit scurry of breaking waves, and with the thought that we were probably the only persons in Australia being lulled to sleep by the sounds of seals barking, moaning, and bleating.

The next morning, the tide being exceptionally low, we were able to get well out on to the surrounding rocky reefs. The seals were most interested in us, some appearing to stand up in the water on "tip-toe" in order to see us better. Whilst in the water the seals are most graceful creatures, gliding through the water at great speed and appearing to be always at play. They were constantly on the move—leaping completely out of the sea; plunging up and down, or throwing a piece of seaweed into the air and darting after it almost to catch it as it fell.

Occasionally, some would lie peacefully at rest in the moving sea, gently scratching their sides with a flipper, or follow us in the surrounding sea, as we walked over the rocks. Garnsey and I spent a delightful ten minutes watching about eight seal pups at play, in and at the entrance of a cave at the end of a waterworn channel. Wrestling, snarling and romping around to the accompaniment of duck-like noises, they were completely oblivious of our

presence only about four feet above.

In view of the complaints by fishermen that the seals spoil the fishing, it was rather surprising to see a local fisherman bring his boat, with a fishing party of about twelve persons, to within a quarter of a mile of Seal Rocks, and to see them actually hauling up fish within a short time.

We were informed by Fred Baum and Kevin Chipperfield, the research officers on the Rocks, that Silver Gulls, Crested Terns, Sooty Oyster Catchers, and Welcome Swallows have nested there; and other birds either having been observed, or flying close enough to be identified, have been the White-capped Albatross, Giant Petrel, Short-tailed Shearwater, Gannets, Fairy Tern, Southern Skua, Dusky Wood Swallow, Starling, Goldfinch, Satin Flycatcher, Barn Owl, White-faced Heron, White-breasted Cormorant, Spur-winged Plover, Royal Spoonbill, Turnstone, Grey Thrush and Blackbird.

Phillip Island, with its attractions of Fairy Penguins, Short-tailed Shearwaters, koalas, and seals, is uniquely blessed with Australian fauna, and of course has a tremendous tourist potential. It is to be hoped that, even if for no other reason, the Victorian Government, together with the residents of Phillip Island, will make certain that the seals of Seal Rock are preserved for all time.

Publications containing reports on this interesting research project are *Fur, Feather, and Fins*, Newsletter of Fisheries and Wildlife Dept. No. 89 of Nov. 1965; and *Seals of Western-port* Wildlife Circular No. 18.

Granite outcrop with sea-squirt zone and the Southern Bull Kelp *Durvillea potatorum*, just exposed below it. (see Some Littoral Plants of Flinders Island, by Peter Saenger. *Vict. Nat.* **84** (6): 168-70, June 1967.)

The Description and Mapping of Vegetation in Australia: a Contribution to the International Biological Programme

By G. Ross Cochrane*

Speaking at the 39th A.N.Z.A.A.S. Conference at Melbourne in January this year, Professor Specht of the University of Queensland highlighted one of the basic problems facing Australia's active participation in the International Biological Programme (I.B.P.), viz.: that of vegetation description. Specht emphasized that before detailed studies can be made of the continent's plant resources it is necessary to know what communities are present and their distribution. However, even the simple, very generalized classification of Australian plant communities submitted to the meeting by Professor Specht as a basis for mapping for the I.B.P. was not universally accepted.

Dr. Coaldrake, of the C.S.I.R.O., also speaking at the same conference, observed that no readily available account of trends in vegetation description in Australia had yet been published. In drawing parallels with other countries he regretted that this state of affairs existed and expressed the hope that this deficiency in Australian vegetational literature would not continue.

This paper attempts to answer something of both problems raised by these two speakers. It will outline developments in the description and mapping of vegetation in Australia. Not all vegetation maps will be discussed, nor can more than a small portion of selected examples of the great quantity of descriptive work published be used to demonstrate achievements, to illustrate trends, and to outline problems in vegetation description in Australia.

The purpose of the paper is not to postulate new avenues of research but, having drawn attention to achievements, to also emphasize the grave deficiencies in fundamental vegetation description within Australia. Whilst new approaches in vegetation description are necessary, nay vital, for healthy growth excessive preoccupation with seeking new methods rather than the accumulation of basic vegetal information of the continent when such great gaps exist, is unhealthy. There is now a danger that much work could become superficial because of limitations in the knowledge of the basic floristic, ecological and structural characteristics of many plant communities. Details of the distribution of many taxa, of the structural features of many plant groupings, and of their habitat tolerances are virtually unknown.

Vegetation is one of the singly most significant aspects of the landscape that a geographer studies. Humboldt stated:

> If the characteristic aspect of different portions of the earth's surface depends conjointly on all the external phenomena—if the contours of the mountain, the physiognomy of plants and animals, the azure of the sky, the form of the clouds, and the transparency of the atmosphere, all combine in forming the general impression which is the result of the whole—yet it cannot be denied that the vegetable covering (or lack of it) with which the whole world is adorned is the principal element in the impression.
>
> (Humboldt, 1805 [1849], 16.)

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More recently Kuchler (1954, 434) expressed essentially the same viewpoint. However, vegetation is complex; it is the spatial and temporal expression of the flora of an area, it consists of plant communities (Grisebach, 1872), and these in turn consist of individual species (Du Rietz, 1930b) with varied life-forms (Warming, 1909; Raunkaier, 1934) that live together. Furthermore, vegetation, varying widely floristically, structurally, and in its spatial distribution, is a highly complex system delicately adjusted within itself and to its broader environment, so that any characteristics of the vegetation are indicators of various other environmental aspects (Clements, 1936; Weaver and Clements, 1938; Daubenmire, 1939; Jenny, 1941; Oosting, 1950; Egler, 1951; Dansereau, 1957; Polunin, 1961; Eyre, 1963).

Plant communities are not only excellent indicators of coarser environmental and historical aspects of landscapes, but they also illustrate very vividly more subtle and hidden characteristics such as slope, aspects, pyric, micro-edaphic and microclimatic factors, and the influenece of competition of plants, of animals (Shelford and Olson, 1935; Clements and Shelford, 1939), or of man (Daubenmire, 1952). The whole "ecosystem" (Tansley, 1935) effects and is affected by vegetation. Consequently, a knowledge of vegetation is of value to a wide variety of workers in many disciplines.

In the study of vegetation there are two different sets of problems involving, firstly, the *description* of vegetation and secondly, concerning the *relationships* of vegetation. Geographers' primary interest is generally descriptive, but they are also vitally concerned with the interrelationships of vegetation with other factors of the environment. Their chief concern is with areas; within these areas they are particularly interested in the character of the vegetation and ultimately with its interrelationships with other phenomena, and the dynamic aspects of change in the vegetal features.

In contradistinction, systematic scientists with their different points of view, consider the phenomena (plants) either individually or collectively rather than areas *per se*. Thus, studies of the vegetation of an area by taxonomists, ecologists, geographers, geneticists, foresters and others provides a varied range of information. The various methods used—mainly floristic, ecological or physiognomic, but also cytological, phytosociological and physiological—the different techniques adopted by Australian investigators (Wood, 1925, 1933, 1959; Beadle and Costin, 1952; Goodall, 1953a, 1953b, 1954, 1961, 1965; Christian and Perry, 1953; Costin, 1954; C.S.I.R.O. Land Research, 1952-62; Specht, 1957, 1958a, 1958b; Ashton, 1958; Webb, 1959; Burbidge, 1960a, Webb *et al.*, 1967), and the purposes of the studies by workers in various disciplines result in a variety of conclusions each reflecting the different point of view of the investigators concerned.

All these conclusions contribute to a more comprehensive knowledge of the vegetation of an area but the usefulness, to geographers and workers in other fields, of this type of technical information varies enormously.

Methods of Vegetation Description

Although inevitably overlapping and occurring concurrently, one of three main methods of vegetation description—(1) *floristic* (the floristic composition of vegetation based on individual species), (2) *ecological* (plant-habitat relationships), (3) *physiognomic* (form or structure of

plant communities)—has been emphasized at different times within Australia. Raup (1942), Dansereau (1951) and Kuchler (1954) give concise summaries of the aims and methods of such vegetation description. Wace (1967) recently discussed the problems of achieving any "universal" classification of vegetation. For more detailed treatment the works of authors cited in each of the following sections should be consulted. Blake (1938), Wood (1939, 1949), Crocker and Wood (1947), Beadle and Costin (1952), Costin (1954), Williams (1955), Christian (1959), Webb (1959), Wood and Williams (1960) and Cochrane (1963a) discuss aspects of these methods with reference to Australia vegetation.

Floristic Vegetation Description

The floristic approach to vegetation description—entailing a detailed knowledge of the species present in an area and usually requiring some formal botanical training by the worker—results in a detailed inventory of the plants present in a locality. As well as species lists, frequently some statistical summary of the total numbers of individuals (frequency) within the plant groupings is included. Lifeform spectra (Raunkaier, 1934) of plant communities are often included although they are not strictly part of floristic description. This is a token attempt to weld elements of ecological and floristic description. In its narrowest sense floristic vegetation description can be confined to the recognition and detailed taxonomic description of the flora, especially the systematic describing of new species (Du Rietz, 1930b; Camp and Gilly, 1943; Gardner, 1945; Willis, 1962a).

Most vegetation studies in Australia up until approximately 35 years ago were, of necessity, floristic; essentially the compiling of taxonomic lists of flora. This represents the initial pioneering or exploratory stage. Vegetation description was confined chiefly to the identification and recording of species. Distribution was recorded by locality naming rather than by mapping of any nature.

The earliest record of published descriptions of Australian vegetation followed Dampier's cruise in 1699 (Dampier, 1703). Little was done during the eighteenth century. However, throughout the nineteenth century vast collections of plants were gathered and, as a result, notable progress in the description, naming, and classification of the continent's flora resulted. Robert Brown collected 3,900 species in the period 1802-1805. Ferdinand von Mueller between 1852-1868 gathered a herbarium collection of 350,000 specimens. Outstanding early contributors to the classification (taxonomic studies) of Australia's flora were Brown (1810), Mueller (1858-82) and Bentham (1863-78).

The latter's contribution is among one of the most important in Australian vegetation description: *Flora Australiensis* is a fundamental work even today. Classifications by Bentham of some of the major families of Australian vegetation have remained virtually unaltered.

Hooker (1860) in *Introductory Essay to the Flora of Tasmania* made a notable contribution to the understanding of the main elements of Australia's flora and to their broad plant geographical relationships. The continental plant cover emphasis of all these major early botanists was followed and in part was paralleled by prodigious local vegetation description by many other workers.

The last decade of the nineteenth century and the first two decades of the present century were important for the appearance of systematic floras of the Australian States (Moore,

1893; Bailey, 1899-1902; Rodway, 1903; Ewart and Tovey, 1905; Maiden and Betche, 1916; Ewart and Davies, 1917; Black, 1922-1929; Ewart, 1930; and Gardner, 1931). Typical of vegetation description of this time are the lengthy species lists of Turner's work on forage plants (1891), on grasses of New South Wales (1890) and Australia (1895) and his studies on the botany of New South Wales (1903a, 1903b, 1904, 1905). Cambage's botanical studies on the native flora of New South Wales (1904a, 1904b, 1905a, 1905b), Maiden's monumental studies of the genus *Eucalyptus* (1903-1933), and the revision of this same large genus by Blakely (1934) also characterize the painstaking vegetation description of this initial floristic period.

Brief historical accounts of the work of these major botanical investigators, and, in some cases, of the areas covered during their investigations, as well as that of many other early botanists and explorer-collectors are outlined for Australia as a whole (Maiden, 1908), for Queensland (Maiden, 1910; Blake, 1955), for New South Wales (Maiden, 1908), for Victoria (Maiden, 1908a; Willis, 1961, 1962), for South Australia (Black, 1922), and for West Australia (Gardner, 1942).

The universal emphasis throughout most of the last century was upon floristic vegetation description. A changed emphasis that occurred in Europe and North America in the 1890's and 1900's was not strongly felt in Australia for another three decades (see later). By the late 1920's much fundamental vital information about Australian vegetation had been amassed. There had been significant achievements in the description and knowledge of vegetation of the continent. Some of the broader taxonomic problems had been investigated but by no means solved. The distribution of species was "known" by listed place names and general localities where herbarium specimens had been collected, but vegetation mapping was virtually non-existent. The emphasis upon individual species rather than on broader groupings of vegetation militated against ease of plotting map distributions.

Workers were, for the most part, unaware of relationships of taxa to climate, soils and land-use. Also, the utilitarian value of vegetation maps was not generally appreciated at this time. The results of field investigations of vegetation were largely floristic lists. Such descriptions of vegetation communities—as distinct from identification of an individual or a new species—during the latter years of this initial period were becoming increasingly important but, being restricted largely to an analysis of the floristic composition, each tended to be a study in isolation.

The need for some additional form of classification of the infinite variety of floristic characteristics of vegetation into more workable *comparative* units became increasingly apparent. As botanists became aware of broad similarities in floristic composition in plant structure, and in vegetation-habitat relationships new approaches to vegetation study were adopted similar to those developed 20 to 30 years earlier in Europe and America.

It is important to note that for vast areas of Australia that are still vegetatively relatively unexplored (notably in West Australia, Northern Territory, and West and North Queensland), the floristic technique is still important today. Detailed taxonomic studies of new species (Burbidge, 1946, 1953, 1960a; Smith, 1947-59; Blake, 1953, 1954; Chippendale, 1960 *et seq.*) and floristic lists of hitherto little known vegetation communities (C.S.I.R.O.

Land Research, 1952-62*; Chippendale, 1958) are essential prerequisites for future ecological investigations or for possible future utilization of Australia's "empty (?) tropical lands" or other waste areas (Litchfield, 1956).

Recently taxonomists have made important contributions in the utilitarian planning of new areas. Knowledge advanced by botanists about fodder potential, toxic properties, and the value of indicator species can remedy many mistakes formerly learned in the slow school of costly experience by trial and error.

Modern work on floristic plant geography places greater emphasis upon exact distributions. Willis' revision of Victorian flora (1962a) and his current work upon the State's dicotyledons both contain detailed information on species distribution.

A notable advance in floristic vegetation description by more recent workers is the inclusion of maps of distributions of species. These range from small scale maps generally (Blake, 1953; Burbidge, 1953) to some large scale ones (Litchfield, 1956), but in all cases they are infinitely more valuable, for a variety of workers, than mere locality reference on herbarium sheets—the accepted method of recording distribution by so many earlier investigators. Currently working in conjunction with the Monash University Botany Department, Willis is also recording species distributions on a large scale grid map of Victoria. This is contributing valuable information about plant distributions and correcting many earlier erroneous concepts.

Despite the large volume of floristic description accumulated about Australian vegetation such information often suffered from its limited application. For geographers and many other workers seeking definition or description of the vegetal environment such detailed, necessary but specialized floristic descriptions often proved frustrating and inadequate.

On the other hand, the great lack of much basic taxonomic information has also hindered workers. Williams (1967) has suggested an answer. Deploring the lack of a national Australian Taxonomic Institute, he has urged that one be established by C.S.I.R.O. and that modern computer techniques be applied to taxonomy. Although many practical problems exist such a revolutionary development offers tremendous scope for solving—or at least easing—the backlog of basic taxonomic data present today.

Various popular taxonomic books about families (e.g. Orchidaceae) or describing some of the more common or unusual members of state floras have made small but useful contributions to vegetation description within Australia, as has also the C.S.I.R.O.'s *Standardized Plant Names* (1953).

Ecological Vegetation Description

In Europe and North America the universal floristic emphasis of the nineteenth century underwent a rapid change to largely ecological plant description in the early twentieth century following the pioneer works of Warming (1895, 1909), Schimper (1898, 1903), Cowles (1891, 1901, 1911) and Clements (1904, 1905, 1907). There had been a growing awareness that distinct plant groupings or communities (Grisebach, 1872) could be recognized, not only by *floristic composition,* but also upon their distinctive *life-forms* (Warming, 1909; Smith, 1913; Raunkaier, 1934; Du Rietz, 1931; Cain, 1950), by their habitat (Warming, 1909, Cowles,

* Floristic investigations are part only of the vegetation surveys conducted by this organization.

1899; Clements, 1905, 1916, 1920), and by their *structure* (Humboldt, 1805, 1807; Warming, 1909; Clements, 1904, 1916; Tansley, 1920; Tansley and Chipp, 1926).

Allied with this awareness was the realization that a very close link existed between "plant habitat" and "life-form"—that is the characteristic vegetative form of a plant essentially reflected the characteristics of the environment (habitat). These workers showed that four main phenomena of the environment—climatic, edaphic, physiographic, and biotic—exerted important influences upon the vegetation. Succession (Cowles, 1911; Clements, 1928; Tansley, 1929) or stage of maturity of vegetation was essentially delicately adjusted with its environment (Cooper, 1926). Many later workers, all essentially in agreement, amplified or modified this fundamental concept of every plant species requiring a specific environment for its existence (Weaver and Clements, 1929; Phillips, 1931, 1934, 1935; Shelford, 1931; Braun-Blanquet, 1932; Cain, 1932, 1944; Tansley, 1935, 1939; Du Rietz, 1936; Clements and Shelford, 1939). Webb *et al.* (1967), using modern computer techniques, have demonstrated that this basic truth applies even to very complex rainforest communities.

Although the study of plant ecology developed rapidly overseas in the first two decades of this century, a lag of over twenty years was experienced in Australia apart from a few notable exceptions, e.g. Osborn and Wood (1923), Adamson and Osborn (1924), Brough, McLuckie and Petrie (1924) and McLuckie and Petrie (1927). With the growing knowledge of the flora of Australia in this century—particularly the appearance of the various *Flora* of Australian states, *vide* p. 302—emphasis in vegetation description followed the overseas trend and swung towards ecological studies in the 1930's. Prescott's (1931) illustration of climate-soil-vegetation relationships in Australia demonstrated the utilitarian value of ecological vegetation studies. Although at a very small scale, Prescott's map was continent wide and reduced the complexity of vegetation to 14 major plant associations.

Within ten years several important plant communities had been described ecologically (Patton, 1930, 1933, 1937; Osborn, Wood and Paltridge, 1931, 1932, 1935; Davis, 1936, 1941a, 1941b; Wood, 1936, 1937; Pidgeon, 1936, 1937; Fraser and Vickery, 1938, 1939; Blake, 1938; Herbert, 1938) and many more studies since have contributed much towards the greater understanding of the relationships between vegetation and its environment. Despite the able contributions in this field only a relatively small percentage of Australian plant communities have yet been described ecologically.

The initial flowering of Australian plant ecological studies demonstrated many significant plant-habitat correlations, but some significant anomalies were also apparent. The dissatisfaction with existing vegetation classifications voiced by Patton (1933), Pidgeon (1937), Wood (1937) and Blake (1938) and experienced by others in the 1930's was climaxed by Wood's (1939) philosophical study of the fundamentals of plant ecology.

Humboldt (1806, 1807) first clearly demonstrated a causal relationship between climate and vegetation, and American experience in the twentieth century had led prominent ecologists to believe that the "existence of a causal relation between climatic conditions and the vegetation of any given region is so well known as to have become practically axiomatic" (Livingstone and Shreve, 1951, 581).

Yet early ecological works showed that such was often not the case in Australia.

Wood (1939) showed that Clement's concept of the "climax plant community" (Clements, 1936) often does not apply in Australia. Considerable modifications, irregularities and apparent anomalies are frequent. Relief, drainage and soil differences—especially mineral deficiencies—result from elements of past geological (David, 1950) and climatic history (Crocker, 1941, 1946b, 1959; Crocker and Wood, 1947; Gill, 1955; Jessup, 1958; Galloway, 1965) as well as variable physiological tolerance of different species (Specht and Perry, 1948; Wood and Brownell, 1957; Specht, 1957, 1963; Martin and Specht, 1962) largely explain departures from the expected "climax" vegetation (*sensu* Clements, 1936, not Tansley, 1935). Sclerophyll forest, dwarf scrub, heath, mallee-broombush and mallee-heath associations occur in closely adjacent areas where the true climatic climax vegetation is a quite different association—a woodland! These anomalous areas, when investigated, have proved to be variably mineral deficient in major plant nutrients, N, P, K, but often deficient in micro-nutrients also (Crocker, 1944; Coaldrake, 1951; Specht, 1951, 1957, 1963; Specht *et al.*, 1958; Specht and Rayson, 1957; Williams, 1958).

Continuing post glacial changes of floristic, edaphic, and climatic adjustments contribute to the divergences from the general pattern of climatic climax vegetation (Wood, 1939, 1959; Crocker and Wood, 1947; Specht, 1958b; Burbidge, 1960b). This phenomena is not restricted to Australia as some New Zealand plant associations are also out of harmony with the existing climatic environment (Zotov, 1938-39; Holloway, 1954).

Wood (1939) contributed directly to ecological investigations by outlining a "convenient" classification (it was soon superseded) for Australian conditions, and also indirectly—and, in the long term, more importantly—by illustrating the failings of Clements' *monoclimax concept*. Outside Australia the *polyclimax* concept of Tansley (1935) was seen to be fundamentally more sound so that many ecological workers in the 1940's were not unduly preoccupied with the status or maturity of vegetation but rather concerned with describing the existing vegetation and its environmental relationships.

Within Australia, however, many still adhered to Clements' system with various local modifications and personal interpretations added. Nevertheless, many useful studies resulted and the ecological proliferation of the 1940's was additionally valuable as the production of distribution maps of vegetation communities, often accompanied by soil and geological maps, became a frequent practice (Crocker, 1940, 1944, 1946a; Crocker and Skewes, 1941; Gardner, 1942; Eardley, 1943; Patton, 1944; Jessup, 1946, 1948, 1951; Boomsma, 1946, 1948; Beadle, 1948; Specht and Perry, 1948; Everist, 1949; Specht, 1950).

This intensive mapping programme by Australian ecologists suffered seriously from a lack of uniformity: a lack of uniformity in concepts and in their application, in classifications used, in definition and in use of terms amongst ecologists severely hampered the comparative study of Australian vegetation. The fundamental floristic unit, "association", had almost as many interpretations as workers using it. Similarly, "dominant species" was variously interpreted. Much confusion resulted from indiscriminate naming of structural vegetation units in climatic terms often based on arbitrary

acceptance or modification of Clements' monoclimax concept. This problem was not an isolated one limited to Australia (Whittaker, 1951).

A noteworthy advance in ecological thinking was the timely plea by Beadle and Costin (1952) for uniformity in classificatory units and in terminology. Their profound analysis of the basic fundamentals of plant ecology was

> "based on the principle that vegetation should be described objectively in terms of its floristics and structure without reference to the complex of factors governing it (the interpretation of the status of the community is not part of this descriptive account)" (Beadle and Costin, 1952, 61).

—note the similarity of purpose with the geographer's primary interest in vegetation description. They suggested a classificatory scheme modified from European and American systems that, they felt, "would lead to some uniformity in ecological units within Australia" (1952, 61). Their objective classifications on both structural and floristic bases for both climax and seral plant communities was fundamentally more sound and more workable for a practical field investigation than the various former, chiefly Clementian-based classifications. Beadle and Costin's scheme allowed investigators to avoid preoccupation with the status of vegetation whilst enabling them to *describe what was present.*

Furthermore, the scheme allowed for flexibility without loss of uniformity or distraction from the comparative value of studies: it allowed a wide range of emphasis from essentially floristic to essentially structural although the combined floristic-structural system was considered most valuable for Australian vegetation studies.

Great gaps still exist in the vegetation description of Australia so the Beadle and Costin structural system, because it is the most rapid and requires least botanical knowledge, is useful for workers engaged in reconnaissance ecological surveys (C.S.I.R.O. Land Research, 1952-62) or for many other workers who "require a knowledge of the vegetation merely as a background for the study of some other feature of the environment" (Beadle and Costin, 1952, 70).

Another important contribution, and one of particular interest to geographers, was the assumption that mapping of vegetation units was considered an integral part of ecological description.

Two broad trends in plant ecology, although present earlier, became more evident after the early 1950's. These were concerned (a) with the macro-environment/plant relationships and (b) with micro-environment/plant relationships. The broad ecological surveys—generally following Beadle and Costin (1952)—of Moore (1953), Costin (1954, 1957a, 1957b), Specht (1958b), and Carr and Turner (1959) are representative of the first trend and have contributed notably to ecological knowledge in Australia. Surveys by C.S.I.R.O. Land Research include broad reconnaissance ecological description as well as "Land Systems"*, each with its own characteristic vegetation.

Examples of the second trend are the detailed autecological studies of Ashton (1958, 1966) and Specht, Brownell and Hewitt (1961), and the synecological investigations of O. B. Williams (1955), Baur (1956), Webb (1958), Costin (1958), Costin *et al.* (1959), Costin *et al.* (1960), Turner, Carr and Bird (1962), Cochrane (1963b, 1966), Willis (1964), Coch-

* These are highly generalized regional transect diagrams relating several physical factors of the environment.

rane and McDonald (1966), Parsons (1966) and Ashton and Gill (1966). Numerous studies that often approach closely to plant physiology (Specht and Rayson, 1957a, 1957b; Rayson, 1957; Specht, 1957a, 1957b, 1963; Specht *et al.*, 1958; Martin, 1961; Martin and Specht, 1962) are also representative of this micro-environment/plant relationship trend. Numerous other examples with maps of vegetation distribution and illustrative of both trends are listed by the Dept. National Development (1961, 1966).

Plant ecology in Australia is now a mature discipline. The most complete studies of vegetation are to be found in recent ecological studies (e.g. Costin, 1954) that incorporate elements from all three approaches (floristic, ecological, structural). Recent ecological studies, free now from preoccupation with the status of vegetation, clearly indicate the following close plant-habitat relationships. Certain species exist where conditions permit their survival, but the inherent characteristics of a species (Hayman, 1960) and the circumstances of the environment jointly control the spread of plant life over the earth. Furthermore, both the species and the environment undergo a continuous process of change.

Physiognomic Vegetation Description

Over the last thirty years outside Australia and particularly during the last decade within Australia, there has been an increasing awareness of the value to botanists and non-botanists alike, of vegetation studies based on physiognomy. Emphasized early by Humboldt (1806), and revived by Schimper (1903), structure of vegetation was given partial cognizance in some ecological work. Although wide use was made of life-forms, as such, they were found to be inadequate for complete description of structure.

The physiognomic emphasis resulted directly from dissatisfaction with ecological preoccupation with plant-environment relationships to the detriment of actual objective description of vegetation. Du Rietz (1930a, 1931), impatient with the hypothetical division lines between characters that could be interpreted variously according to the student's opinion, returned directly to the old views of Humbolt and Grisebach, maintaining that vegetation description should be an objective classification based upon pure form, and completely eliminating all assumption between environment and plant. Richards, Tansley and Watt (1940, 229) continued this trend: "Vegetation should be characterized *by its own features,* not by habitat, indispensable as is the study of habitat for the understanding of its nature and distribution. It is the *structure* and *composition* of a plant community that we must first ascertain and record as the secure basis of all subsequent knowledge". (Present author's italics). Küchler (1947, 1949, 1956, 1966) emphasized the importance of physiognomic vegetation description for geographers.

Within Australia Prescott's (1931) map of Australian vegetation was fundamentally, though not consistently, based upon structural vegetation units. Wood (1949) suggested an Australian structural classification closely akin to the ideas of Küchler (1947). Another overseas worker, Dansereau (1951), was strongly influenced by Küchler and exerted an important influence upon much subsequent physiognomic vegetation description in Australia. Beadle and Costin (1952) emphasized the importance of structure whilst clearly indicating its relationship to floristic vegetation des-

cription. Christian and Perry (1953) essentially followed Dansereau. Their classification, even more than Dansereau's (1951) scheme is very valuable for detailed structural description of vegetation on a local scale. The flexibility of the classification makes it a little unmanageable for comparative studies over large areas.

An important result of Dansereau's influence was the appearance, in 1955, of the most comprehensive and valuable vegetation map of Australia then published (Williams, 1955). This physiognomic vegetation map and a revised map and description of the vegetation of Australia by Wood and Williams (1960) are significant contributions to the growing importance of structural vegetation description.

Wagner's (1957) stylized profile diagrams of vegetation structure and Fosberg's (1961) somewhat elaborate structural classification for general vegetation description have not been adopted in Australian studies. Recently, Specht advocated the use of a modified Wood (1949) structural classification to describe Australian communities for the International Biological Programme.

One of the most important merits of physiognomic vegetation description is its value for comparative studies. The necessity for such a classification became increasingly apparent particularly as ecological knowledge in Australia expanded. Other merits are its rapidity and its simplicity for mapping—for many parts of Australia requiring broad studies it is the only practical one—its objective basis requiring a minimum of formal botanical knowledge, and its universal appeal (i.e. its ease of application and the scope for its subsequent use) to a wide range of workers. Furthermore, the physiognomy of a plant community is an excellent indicator of the complex of environmental characteristics influencing it. Structural vegetation description is a logical beginning point for subsequent investigations. These aspects are discussed more fully by Cochrane (1936a).

Although all vegetation workers would not easily agree on the central problems of vegetation description today, most would agree that a physiognomic classification down to the smallest units and based on sound morphogenetic information is of immediate importance. Webb (1959) has divided Australian rainforests into twelve possible subformations on the basis of exclusively physiognomic and structural features and used physiognomic nomenclature and symbols to describe these. However, unless some agreement can be achieved to use one system, the geographical value of these structural classifications for comparative studies of vegetation is limited.

Cochrane (1963a, 1967) has prepared maps of Australian vegetation for comparative studies with published world maps using Küchler's physiognomic classification. Comparisons might be possible between these units and those of genetic taxonomy but Arndt and Norman (1959), Perry (1960) and Perry *et al.* (1962) clearly demonstrated that there are severe practical limitations to such attempts.

At the heart of the problem of vegetation description in Australia is the overall paucity of all facets of description. Advanced phytosociological techniques (Braun-Blanquet, 1932)—concerned with the establishment of a hierarchy of plant groupings based on the relative frequency and fidelity of occurrence of taxonomic units—have not been seriously tried in Australia, chiefly because of the lack of basic data. This approach has influenced some workers (e.g.

Costin) but is not yet obviously in use in Australia.

Again, lack of much basic data has possibly limited the wider acceptance within Australia of statistical description of vegetation developed by the Australian worker, Goodall (1953 *et seq.*).

Goodall's objective quantitative methods of vegetation description have profoundly influenced the world thought but have had significantly less impact at home.

Notable contributions to the description of past vegetation and to a better understanding of some present distributions have been made by many workers from palaeobiogeographical and biogeographical evidence (Hooker, 1860; Diels, 1906, 1936; Camp, 1947; David, 1950; Fleming, 1957; Specht, 1958c; Burbidge, 1960; and Glaessner, 1962). One of the most productive sources of information in this field has been the Melbourne University School of Botany (Duigan, 1951; Cookson, 1952, 1957; Cookson and Pike, 1953; Cookson and Eisenack, 1960a, 1960b, 1961; and Cookson and Manum, 1960). Research in this field has also been developed recently at Canberra.

Conclusion

This study does not pretend to have covered all phases or aspects of vegetation description and mapping in Australia. Three well defined stages in vegetation description have been recognized, each being relatively more important at different periods of time. All methods are still actively employed today, but often with a different bias than earlier. Thus in floristic description the use of cytological and palaeobotanical studies to determine phytogeographical distributions is of increasing importance today. Computer techniques may alter present taxonomy methods almost beyond recognition and serve other branches of vegetation description also.

In plant ecology, there are almost as many techniques as workers. Studies bordering closely on plant physiology are increasing as workers seek the answers to fundamental plant-habitat relationships. A blossoming of ecological studies may follow on acceptance of computer techniques in analysing ecosystems. Qualitative studies are being challenged by statistical studies, although one may query the "simplification" (Greig-Smith *et al.*, 1963) and the value of procedures for "objective simplification of vegetational diversity" (Goodall, 1953b, 323).

There is a smaller range of methods in physiognomic vegetation studies as an important argument here is for uniformity for use in comparative studies. Most workers recognize the basic importance of physiognomic vegetation description. It should be noted, however, that *complete* vegetation description is not achieved by the use of only one method. (Fosberg, 1958; Cochrane, 1963a; Wace, 1967).

Australian vegetation description, in its historical aspect, can be likened to a tree that constantly branches as the sum total of knowledge increases and sub-division of the field becomes necessary. The numerous contributions in Keast *et al.* (1959) clearly indicate the vigour of recent branching. However, the quite considerable gaps in our knowledge of Australian vegetation are being but slowly filled-in albeit from many sides.

In any modern sense, taxonomy in Australia is pitifully crude. Many taxonomic problems remain to be solved.

Similarly, although there have been some extremely able contributions by ecologists, about nine-tenths of the Australian plant communities have yet to be fully described ecologically.

Finally, although most vegetation workers agree that physiognomic description of vegetation is desirable, the concern expressed by Specht almost two years after the I.B.P. had begun that there was not a universally acceptable structural classification in use to describe the Australian plant communities demonstrates that much is still to be achieved in this direction.

Literature Cited

Adamson, R. S., and Osborn, T. G. B., 1924. The ecology of the *Eucalyptus* forests of the Mount Lofty Ranges (Adelaide District), South Australia. *Trans. Roy. Soc. S. Aust.*, **48**: 87-144.

Arndt, W., and Norman, M. J. T., 1959. Characteristics of native pasture on Tippera clay loam at Katherine, N.T. *C.S.I.R.O. Aust. Div. Land Res. Reg. Surv. Tech. Pap.* **24**: 3.

Ashton, D. H., 1958. *The ecology of Eucalyptus regnans.* F. Muell: the species and its frost resistance. *Aust. J. Bot.*, **6**: 154-176.

————, 1966. Regeneration pattern of *Poa foliosa* Hook F. on Macquarie Island. *Proc. Roy. Soc. Vict.*, **79**: 215-232.

Ashton, D. H., and Gill, A. M., 1966. Pattern and process in a Macquarie Island feldmark. *Proc. Roy. Soc. Vict.*, **79**: 235-246.

Bailey, F. M., 1899-1902. *The Queensland flora.* Parts I-VI (Brisbane).

Baur, G. N., 1957. Nature and distribution of Rainforests in New South Wales. *Aust. J. Bot.*, **5**: 190-234.

Beadle, N. C. W., 1948. *The vegetation and pastures of western N.S.W.* (Govt. Printer, Sydney).

Beadle, N. C. W., and Costin, A. B., 1952. Ecological classification and nomenclature. *Proc. Linn. Soc. N.S.W.*, **77**: 61-82.

Bentham, G., 1863-78. *Flora Australiensis:* a description of plants of the Australian territory, by Bentham, assisted by Mueller. 7 vols. (Ldn).

Black, J. M., 1922-29. *Flora of South Australia,* Vols. I-IV (Adelaide).

Blake, S. T., 1938. The plant communities of Western Queensland and their relationships, with special reference to the grazing industry. *Proc. Roy. Soc. Qld.*, **49**: 156-204.

Blake, S. T., 1953. Botanical contributions to the Northern Australian regional survey. I. Studies of Northern Australian species of *Eucalyptus. Aust. J. Bot.*, **1**: 185-352 (30 distribution maps).

————, 1954. Botanical contributions of the Northern Australian regional survey. II. Studies on miscellaneous Northern Australian Plants. *Aust. J. Bot.*, **2**: 99-140.

————, 1955. Some pioneers in plant exploration and classification. *Proc. Roy. Soc. Q.*, **66**: 1-19.

Blakely, W. F., 1934. *A key to the Eucalypts.* (Sydney).

Boomsma, C. D., 1946. The Vegetation of the Southern Flinders Ranges, South Australia. *Trans. Roy. Soc. S. Aust.*, **70**: 259-276.

————, 1949. The Ecology of the Western Clare Hills, South Australia. *Trans. Roy. Soc. S. Aust.*, **72**: 216-220.

Braun-Blanquet, J., 1932. Trans Revised and ed.—Fuller, G. D., and Conard, H. S. *Plant Sociology, The Study of Plant Communities.* (McGraw-Hill, N.Y. and Lond.).

Brough, P., McLuckie, J., and Petrie, A., 1924. An ecological study of the flora of Mount Wilson Pt. 1. The vegetation of the basalt. *Proc. Linn. Soc. N.S.W.*, **49**: 475-498.

Brown, R., 1810. *Prodromus Florae Novae Hollandiae.* (London).

Burbidge, N. T., 1946. A revision of the Western Australian species of *Triodia* R. Br. *J. Roy. Soc. W. Aust.*, **30**: 15-33.

————, 1953. The genus *Triodia* R. Br. *Aust. J. Bot.*, **1**: 121-184.

————, 1960a. Further notes on *Triodia* R. Br. (Gramineae) with description of five new species and one variety. *Aust. J. Bot.*, **8**: 381-389.

————, 1960b. The Phytogeography of the Australian Region. *Aust. J. Bot.*, **8**: 75-211.

Cain, S. A., 1932. Concerning certain phytosociological concepts. *Ecol. Monogr.* **2**: 475-505.

————, 1944. *Foundations of Plant Geography.* (Harper and Bros. N.Y.)

————, 1950. Life forms and phytoclimate, *Bot. Rev.*, **16**: 1-32.

Cambage, R. H., 1904a. Notes on the native flora of N.S.W. i. The Tumbarumba and Tumut district. *Proc. Linn. Soc. N.S.W.* **29**: 685-695.

————, 1904b. Notes . . . . ii. The western slopes of New England. *ibid.*, **29**: 781-797.

————, 1905a. Notes . . . . iii. Orange

to Dubbo and Gilgandra. *ibid.*, **30**: 203-221.
————, 1905b. Notes . . . . iv. The occurrence of *Casuarina stricta* Ait, on the Narrabeen Shales. *ibid.*, **30**: 376-391.
Carr, Stella G. M., and Turner, J. S., 1959. The ecology of the Bogong High Plains. I and II. *Aust. J. Bot.*, **7**: 12-63.
Camp, W. H., 1947. Distribution patterns in modern plants and the problems of ancient dispersals. *Ecol. Monogr.*, **17**: 159-183.
Camp, W., and Gilly, C. G., 1943. The structure and origins of species. *Brittonia*, **4**: 323-385.
Christian, C. S., and Perry, R. A., 1953. The systematic description of plant communities by the use of symbols. *Journ. Ecol.*, **41**: 100-105.
Chippendale, G. M., 1958. Notes on the vegetation of a desert area in Central Australia. *Trans Roy. Soc. S. Aust.*, **81**: 31-41.
————, 1960. Contributions to the flora of Central Australia, No. 1. *Trans. Roy. Soc. S. Aust.*, **83**: 199-204.
————, 1961. *Idem.*, No. 2. *ibid*, **84**: 99-104.
————, 1963. *Idem.*, No. 3. *ibid.*, **86**: 7-11.
Christian, C. S., 1959. The ecocomplex in its importance for agricultural assessment. in A. Keast *et al.* (Ed.) *Biogeography and ecology in Australia.* Ch. 34. (Den Haag, Junk).
Clements, F. E., 1904. *The development and structure of vegetation.* Bot. Surv. of Nebraska. Studies in the vegetation of the state. iii.
————, 1905. *Research methods in ecology.* (Lincoln, Nebraska.)
————, 1907. *Plant physiology and ecology.* (London.)
————, 1916. Plant succession. *Carnegie Inst. Wash. Publ. 242.*
————, 1928. *Plant succession and indicators.* (Wilson, N.Y.)
————, 1936. Nature and structure of the climax. *Journ. Ecol.*, **24**: 252-284.
Clements, F. E., and Shelford, V. E., 1939. *Bioecology.* (Wiley and Sons, N.Y.)
Coaldrake, J. E., 1951. The climate, geology, soils and plant ecology of portion of the County of Buckingham (Ninety-mile Plain), South Australia. *C.S.I.R.O. Aust.*, Bull. 266.
Cochrane, G. Ross, 1963a. A physiognomic vegetation map of Australia. *Journ. Ecol.*, **51**: 639-655.
————, 1963b. Vegetation studies in forest-fire areas of the Mount Lofty Ranges, South Australia. *Ecology*, **44**: 41-52.
————, 1966. Bushfires and vegetation regeneration. *Vict. Nat.*, **83**: 4-10.
————, 1967. *A vegetation map of Australia with explanatory notes.* (In Press) (Cheshires, Melbourne).
Cochrane, G., Ross, and McDonald, N. H. Eric, 1966. A regeneration study in the Victorian Mallee. *Vict. Nat.*, **83**: 220-226.
Cookson, Isabel C., 1952. Identification of Tertiary pollen grains with those of New Guinea and New Caledonia beeches. *Nature*, **170**: 127.
————, 1957. On some Australian Tertiary spores and pollen grains that extend the geological and geographical distribution of living genera. *Trans. Roy. Soc. Vict.*, **69**: 41-53.
Cookson, I. C., and Pike, K. M., 1953. The Tertiary Occurrence and distribution of *Podocarpus* (sectopm Dacrycarpus) in Australia and Tasmania, *Aust. J. Bot.*, 71-82.
Cookson, I. C., and Eisenack, A., 1960a. Microplankton from Australian Cretaceous Deposits. *Micropalaeontology*, **6**: 1-18.
————, 1960b. Upper Mesozoic microplankton from Australia and New Guinea. *Palaeontology*, **2**: 243-261.
C.S.I.R.O. *Australian Land Research Series*, Nos. 1-6. 1952-62. (Melbourne, C.S.I.R.O.)
Cooper, W. S., 1926. Fundamentals of vegetational change. *Ecology*, **7**: 391-413.
Costin, A. B., 1954. *A study of the ecosystems of the Monaro region of New South Wales.* (Govt. Printer, Sydney.)
————, 1957a. *High mountain catchments in Victoria in relation to land use.* (Govt. Printer, Melbourne.)
————, 1957b. The high mountain vegetation of Australia. *Aust. J. Bot.*, **5**: 173-189.
————, 1958. The Grazing factor and the maintenance of catchment values in the Australian Alps. *C.S.I.R.O. Aust. Div. Plant. Ind. Tech. Pap.* No. 10.
Costin, A. B., *et al.*, 1959. Studies in catchment hydrology in the Australian Alps I. Trends in soils and vegetation. *C.S.I.R.O. Aust. Div. Plant Ind. Tech. Pop.* No. 13.
Costin, A. B., *et al.*, 1960. Studies in catchment hydrology in the Australian Alps. II. Surface run-off and soil loss.

C.S.I.R.O. Aust. Div. Plant Ind. Tech. Pap. No. 14.

Cowles, H. C., 1899. The ecological relations of the vegetation on the sand dunes of Lake Michigan. *Bot. Gaz.*, **27**: 95-391.

————, 1911. The causes of vegetative cycles *Bot. Gaz.*, **51**: 161-183.

————, 1901. The physiographic ecology of Chicago and vicinity. *Bot. Gaz.*, **31**: 73-108.

Crocker, R. L., 1941. Notes on the geology and physiography of south-east S.A., with reference to late climatic history. *Trans. Roy. Soc. S. Aust.*, **65**: 103-7.

————, 1944. Soil and vegetation relationships in the lower south-east of South Australia. *Trans. Roy. Soc. S. Aust.*, **68**: 144-172.

————, 1946a. An introduction to the soils and vegetation of Eyre Peninsula, South Australia. *Trans. Roy. Soc. S. Aust.*, **70**: 83-107.

————, 1946b. Post-Miocene climatic and geologic history and its significance in the genesis of the major soil types of South Australia. *Aust. C.S.I.R.* Bull. No. 193.

Crocker, R. L., 1959. Past climatic fluctuations and their influence upon Australian vegetation in A. Keast, *et al.* (Ed.). *Biogeography and ecology in Australia*, Ch. 17. (Den Haag, Junk). (Monographical Biological, Vol. 8).

Crocker, R. L., and Skewes, H. R., 1941. The principal soil and vegetation relationships on Yudnapinna Station, northwest South Australia. *Trans. Roy. Soc., S.A.*, **65**: 44-60.

Crocker, R. L., and Wood, J. G., 1947. Some historical influences on the development of the South Australian vegetation communities and their bearing on concepts and classification in ecology. *Trans. Roy. Soc. S. Aust.*, **71**: 91-136.

C.S.I.R.O., 1953. Standardized plant names. *Bulletin No. 272.*

Dampier, W., 1703. *A voyage to New Holland*, etc. in the year 1699. Vol. 3. (Ldn.)

Dansereau, P., 1951. Description and recording of vegetation on a structural basis. *Ecology*, **32**: 172-229.

Daubenmire, R., 1952. Forest vegetation of Northern Idaho and adjacent Washington, and its bearing on concepts of vegetation classification, *Ecol. Monogr.*, **22**: 301-330.

————, 1959. (2nd ed.) *Plants and environment: A textbook of plant autecology.* (Wiley, N.Y.)

David, T. W. E., 1950. *The Geology of the Commonwealth of Australia.* Vol. 1. (Edited and much supplemented by W. R. Browne). (London, Arnold.)

Davis, C., 1936. Plant ecology of the Bulli District. Part i. Stratigraphy, physiography and climate; general distribution of plant communities and interpretation. *Proc. Linn. Soc. N.S.W.*, **61**: 285-297.

————, 1941a. Plant ecology of the Bulli District. Part ii. Plant communities of the Plateau and Scarp. *Proc. Linn. Soc. N.S.W.*, **66**: 1-19.

————, 1941b. Plant ecology of the Bulli District. Part iii. Plant communities of the coastal slopes and plains. *Proc. Linn. Soc. N.S.W.*, **66**: 20-32.

Diels, L., 1906. *Die Pflanzenwett von West-Australien.* (Leipzig.)

————, 1936. The genetic phytogeography of the South Western Pacific area with particular reference to Australia in *Essays in Geobotany in Honour of W. A. Setchell.* (Univ. Calif. Press.). Berkeley.

Dept. National Devmt., 1961. *Index to Australian Resources Maps of 1940-59.* (Canberra, Govt. Printer.)

————, 1966. *Index to Australian Resources Maps Supplement for 1960-64.* (Canberra, Govt. Printer.)

Duigan, Suzanne L., 1951. A catalogue of the Australian Tertiary flora. *Proc. Roy. Soc. Vict., n.s.*, **63**: 41-56.

Du Rietz, G. E., 1930a. Classification and nomenclature of vegetation. *Svensk Bot. Tidskr.*, **24**: 489-503.

————, 1930b. The fundamental units of biological taxonomy. *Svensk Bot. Tidkr.*, **24**: 333-428.

————, 1931. Lifeforms of terrestial flowering plants. *Acta Phytogeogr. Suecica*, **3**: 1-95.

————, 1936. Classification and nomenclature of vegetation units, 1930-35. *Svensk Botanisk Tidskrift*, **30**: 580-589.

Eardley, C. M., 1943. An ecological study of the vegetation of Eight-Mile Creek Swamp; a natural South Australian coastal fern formation. *Trans. Roy. Soc. S.A.*, **67**: 200-223.

Egler, F. E., 1951. A commentary on American plant ecology, based on the textbooks of 1947-49. *Ecology*, **32**: 673-695.

Everist, S. L., 1949. Mulga (*Acacia*

aneura F. Muell) in Queensland. *Qld. J. Agric. Sci.*, **6**: 87-139.
Ewart, A. J., 1930. *Flora of Victoria.* (Melbourne)
Ewart, A. J., and Davies, O. B., 1917. *Flora of the Northern Territory.* (Melbourne)
Ewart, A. J., and Tovey, J. R., 1905. *The weeds, poison plants, and naturalized aliens of Victoria.* (Melbourne)
Fleming, C. A., 1957. Trans-Tasman relationships in natural history. In *Science in New Zealand*, A.N.Z.A.A.S. Hdbk. 228-246.
Fosberg, F. R., 1958. On the possibility of a rational general classification of humid tropical vegetation. *Proc. U.N.E.S.C.O. Humid Tropics Symposium, Tjiawi, Indonesia*, 34-59.
————, 1961. A classification for general purposes. *Tropical Ecology*, **2**: 1-28.
Fraser, L., and Vickery, J. W., 1938. The ecology of the Upper Williams River and Barrington Tops district. 2. Rainforest formations. *Proc. Linn. Soc. N.S.W.*, **63**: 139-184.
Fraser, L., and Vickery, J. W., 1939. The ecology of the Upper Williams River and Barrington Tops district. 3. Eucalypt forest and general discussion. *Proc. Linn. Soc. N.S.W.*, **64**: 1-33.
Galloway, R. W., 1965. Late quaternary climates in Australia. *J. Geology*, **73**: 603-618.
Gardner, C. A., 1931. *Enumeratio Plantarum Australiae Occidentalis.* (Perth)
Gardner, C. A., 1942. The vegetation of Western Australia. *J. Roy. Soc. W. Aust.*, **28**: XI-LXXVII.
————, 1945. Taxonomy and the species concept. *Aust. J. Forest*, **9**: 7-11.
Gill, E. D., 1955. The Australian "Arid Period", *Aust. J. Sci.*, **17**: 204-206.
Glaessner, M. F., 1962. Isolation and communication in the geological history of the Australian fauna in G. W. Leeper (Ed.) *The evolution of living organisms.* 242-249. (Melbourne)
Goodall, D. W., 1953a. Objective methods for the classification of vegetation. I. The use of positive interspecific correlation. *Aust. J. Bot.*, I, 39-63.
————, 1953b. Obj. . . . II. Fidelity and indicator value. *Aust. J. Bot.* I, 434-56.
————, 1954. Obj. . . . . III. An essay in the use of factor analysis. *Aust. J. Bot.*, **2**: 304-324.
————, 1961. *Idem.* IV. Patterns and minimal area. *Aust. J. Bot.*, **9**: 162-196.
Goodall, D. W., 1965. Plot-less tests of interspecific association. *J. Ecol.*, **53**: 197-210.
Greig-Smith, P., Kershaw, A. W., and Anderson, D. J., 1963. The analysis of pattern in vegetation: a comment on a paper by D. W. Goodall. *J. Ecol.*, **51**: 223-229.
Grisebach, A. R. H., 1872. *Die Vegetation der Erde.* (Leipzig)
Hayman, D., 1960. The distribution and cytology of the chromosone races of *Themeda australis* in Australia. *Aust. J. Bot.*, **8**: 58-68.
Herbert, D. A., 1938. The Upland savannahs of the Bunya Mountains, Sth. Queensland. *Proc. Roy. Soc.* 2, **49**: 145-149.
Hollaway, J. T., 1954. Forests and climates in the South Island of New Zealand. *Trans. Roy. Soc. N.Z.*, **82**: 329-410.
Hooker, J. D., 1860. *The botany of the antarctic voyage of H.M. Discovery ships "Erebus" and "Terror". Introductory essay to the flora of Tasmania.* (London, Lovell Reeve.)
Humboldt, A. von, 1805. *Aspects of Nature.* (Engl. Ed., London, 1849.)
————, 1806. *The physiognomy of plants.* (Engl. Ed., London, 1849.)
————, 1807. *Essai sur la geographie des plantes.* (Paris)
Jenny, Hans, 1941. *Factors of soil formation. A system of Quantitative Pedology.* (McGraw-Hill, N.Y. and Ldn.)
Jessup, R. W., 1946. The ecology of the area adjacent to Lakes Alexandria and Albert. *Trans. Roy. Soc. S. Aust.*, **70**: 3-34.
————, 1948. A vegetation and pasture survey of Counties Eyre, Burran and Kimberley, South Australia. *Trans. Roy. Soc. S. Aust.*, **72**: 33-68.
————, 1951. The Soils, geology and vegetation of north-western South Australia. *Trans. Roy. Soc. S. Aust.*, **74**: 189-273.
————, 1958. Erosional phenomena associated with Quaternary aridities in the arid zone of Australia. Paper read at A.N.Z.A.A.S. Sect. C. Adelaide.
Keast, A. *et al.*, 1959. *Biogeography and ecology in Australia.* (Den Haag) (Monographiae Biologicae, Vol. 8.)
Küchler, W. A., 1947. A geographic system of vegetation. *Geogr. Rev.*, **37**: 233-240.
————, 1949. A physiognomic classifi-

cation of vegetation. *Ann. Assoc. Am. Geog.*, **39**, No. 3, Sept. 1949, 201-210.
————, 1954. Plant Geography in P. E. James and C. F. Jones (Eds.): *American Geography Inventory and Prospect*, 428-441. (Syracuse Univ. Press, N.Y.)
————, 1956. Classification and purpose in vegetation maps. *Geogr. Rev.*, **46**: 155-167.
————, 1966. Analyzing the physiognomy and and structure of vegetation. *Ann. Assoc. Am. Geog.*, **56**: 112-127.
Litchfield, W. H., 1956. Species distribution over part of the Coonalpyn Downs, South Australia. *Aust. J. Bot.*, **4**: 68-115.
Livingstone, B. E., and Shreve, F., 1921. Distribution of vegetation in the United States as related to climatic conditions. *Carnegie Inst. Wash. Publ. 284.*
McLuckie, J., and Petrie, A. H. K., 1927. The vegetation of the Kosciusko Plateau. *Proc. Linn. Soc. N.S.W.*, **52**: 187-221.
Maiden, J. H., 1903-33. *A critical revision of the genus Eucalyptus.*
————, 1908. Records of Australian botanists. (a) General. (b) New South Wales. *J. and Proc. Roy. Soc. N.S.W.*, **42**: 60-132.
————, 1908a. Records of Victorian botanists. *Vict. Nat.*, **25**: 101-117.
————, 1910. Records of Queensland botanists. Rept. of 12th Meeting, *A.A.A.S.*, Brisbane, 373-383.
Maiden, J. H., and Betche, E., 1916. *A census of New South Wales plants.* (Sydney)
Martin, Helene A., 1961. Sclerophyll communities in the Inglewood District, Mount Lofty Ranges, South Australia, their distribution in relation to microenvironment. *Trans. Roy. Soc. S. Aust.*, **85**: 91-120.
Martin, Hellene M., and Specht, R. L., 1962. Are mesic communities less drought resistant? A study of moisture relationships in Dry Sclerophyll Forest at Inglewood, South Australia. *Aust. J. Bot.*, **10**: 106-118.
Moore, C., 1893. *Handbook of the flora of New South Wales.* (Sydney)
Moore, C. W. E., 1953. The vegetation of the South-Eastern Riverina, New South Wales. 1. The climax communities, *Aust. J. Bot.*, **1**: 485-547.
Mueller, F. von, 1858-82. *Fragmenta Phytographiae Australiae.* 12 vols. (Melbourne).
Osborn, T. G. B., and Wood, J. G., 1923. Some halophytic and non-halophytic plant communities in arid South Australia. *Trans. Roy. Soc. S. Aust.*, **47**: 388-399.
Osborn, T. G. B., Wood, J. G., and Paltridge, T. B., 1931. The autecology of *Stipa nitida. Proc. Linn. Soc. N.S.W.*, **56**: 299-324.
Osborn, T. G. B., Wood, J. G., and Paltridge, T. B., 1932. Growth and reaction to grazing of the perennial saltbush, *Atriplex vesicarium. ibid*, **57**: 377-402.
————, 1935. The climate and vegetation of the Koonamore vegetation reserve to 1931. *Proc. Linn. Soc. N.S.W.*, **60**: 392-427.
Parsons, R. F., 1966. The soils and vegetation of Tidal River. *Proc. Roy. Soc. Vict.*, **79**: 319-354.
Patton, R. T., 1933. Ecological studies in Victoria. Pt. II. The Fern Tree Gully. *Proc. Roy. Soc. Vict.*, (N.S.) **46**: 117-129.
————, 1934. Ecological studies in Victoria. Part III. Coastal sand dunes. *Proc. Roy. Soc. Vict.*, **47**: 135-157.
————, 1936. Ecological studies in Victoria. Pt. IV. Basalt plains association. *Proc. Roy. Soc. Vict.*, **48**: 172-190.
————, 1937. Ecological studies in Victoria. Pt. V. Red-box-stringbark association. *Proc. Roy. Soc. Vict.*, **49**: 293-307.
————, 1942. Ecological studies in Victoria. Pt. VI. Salt Marsh. *Proc. Roy. Soc. Vict.*, **54**: 131-144.
————, 1944. Ecological studies in Victoria. Pt. VII. Box-ironbark association. *Proc. Roy. Soc. Vict.*, **56**: 35-50.
Perry, R. A., 1960. Pasture Lands of the N.T., Australia. *C.S.I.R.O. Aust. Land. Res. Ser.* No. 5.
Perry, R. A., *et al.*, 1962. Lands of the Alice Springs area, N.T., 1956-57. *C.S.I.R.O. Aust. Land Res. Ser.* No. 6.
Phillips, John, 1931. The biotic community. *Journ. Ecol.*, **19**: 1-24.
————, 1934. Succession development, the climax and the complex organism: an analysis of concepts. I. *ibid.*, **22**: 554-571.
————, 1935. *Idem* II, III. *ibid.*, **23**: 210-246, 488-508.
Pidgeon, Ilma M., 1937. The ecology of the central coastal area of N.S.W. Pt. I. The environment and general features of the vegetation. *Proc. Linn. Soc. N.S.W.*, **52**: 315-340.
————, 1938. . . . . II. Plant succession

on the Hawksbury sandstone, *ibid.*, **53**: 1-26.
Prescott, J. A., 1931. The soils of Australia in relation to vegetation and climate. *C.S.I.R.O. Aust.* Bull. 52.
Rayson, Patricia, 1957. Dark Island Heath (Ninety Mile Plain, South Australia). II. The effects of microtopography on climate, soils and vegetation. *Aust. J. Bot.*, **5**: 86-102.
Richards, P. W., Tansley, A. G., and Watt, A. S., 1940. The recording of structure, lifeform and flora of tropical forest communities as a basis for their classification. *Journ. Ecol.*, **28**: 224-239.
Rodway, L., 1903. *The Tasmanian flora.* (Hobart)
Raunkiaer, C., 1934. *The life forms of plants and Statistical plant geography.* (Clarendon Press, Oxford.)
Raup, H. M., 1942. Trends in the development of geographic botany. *Annls. Assoc. Amer. Geogr.*, **32**: 319-354.
Schimper, A. F. W., 1898. *Plant geography upon a physiological basis.* (Engl. Ed. Oxford 1903.)
————, 1903. *Plant Geography upon a physiological basis.* (Clarendon Press, London.)
Shelford, V. E., 1931. Some concepts of bioecology. *Ecology*, **12**: 455-467.
Shelford, V. E., and Olson, Sigrud, 1935. Sere, climax and influent animals with special reference to transcontinental forests of North America. *Ecology*, **25**: 375-402.
Smith, L. S., 1947-59. New species and additions to Queensland flora. *Proc. Roy. Soc. Q.*, 58-69.
Smith, W. G., 1913. Raunkaier's lifeforms and statistical methods. *Journ. Ecol.*, **1**: 16.
Smith-White, S., 1954. Chromosone numbers in the Boronieae (Rutaceae) and their bearing on the evolutionary development of the tribe in the Australian flora. *Aust. J. Bot.*, **2**: 287-303.
Specht, R. L., 1951. A reconnaissance survey of the soils and vegetation of the Hundreds of Tatiare, Wirrega and Stirling, County Buckingham, South Australia. *Trans. Roy. Soc. S. Aust.*, **74**: 79-107.
————, 1957. Dark Island Heath (Ninety Mile Plains, South Australia). V. The water relationships in Heath vegetation and Pastures on the Makin Sand. *Aust. J. Bot.*, **5**: 151-172.
————, 1958a. An introduction to the Ethno-Botany of Arnhem Land. *Rec. of the Amer.-Aust. Sci. Expd. to Arnhem Land.* Vol. 3, 479-503.
Specht, R. L., 1958b. The climate, geology, soils and plant ecology of the northern portion of Arnhem Land. *Records of the American-Australian Scientific Expedition to Arnhem Land.* Vol. **13**: 333-414.
————, 1958c. The geographical relationships of the flora of Arnhem Land. *Rec. of the Amer.-Aust. Sci. Expd. to Arnhem Land.* Vol. **3**: 415-478.
————, 1963. Dark Island Heath (Ninety-Mile Plain, South Australia). VII. The effect of fertilizers on composition and growth, 1950-1960. *Aust. J. Bot.*, **11**: 67-94.
Specht, R. L., Brownell, P. F., and Hewitt, P. N., 1961. The plant ecology of the Mount Lofty Ranges, South Australia. 2. The distribution of *Eucalyptus elaeophora. Trans,. Roy. Soc. S. Aust.*, **85**: 155-176.
Specht, R. L., and Perry, R. A., 1948. The plant ecology of part of the Mount Lofty Ranges (1). *Trans. Roy. Soc. S. Aust.*, **72**: 91-132.
Specht, R. L., and Rayson, Patricia, 1957. Dark Island Heath (Ninety-Mile Plain, South Australia). I. Definition of the ecosystem. *Aust. J. Bot.*, **5**: 52-85.
Specht, R. L., *et al.*, 1958. Dark Island Heath (Ninety-Mile Plain, South Australia). VI. Pyric succession: changes in composition, coverage, dry weight and mineral nutrient status. *Aust. J. Bot.*, **6**: 59-88.
Tansley, A. G., 1920. The classification of vegetation and the concept of development. *Journ. Ecol.*, **8**: 118-144.
————, 1929. Succession: the concept and its values. *Proc. Intern. Congress Plant Sciences*, **1926**: 677-686.
————, 1935. The use and abuse of vegetational terms. *Ecology*, **16**: 284-301.
————, 1948. The peculiarities of South Australian vegetation. *Journ. Ecol.*, **36**: 181-183.
————, 1939. The British Isles and their vegetation. (Cambridge)
Tansley, A. G., and Chipp, T. F. (Eds.), 1926. *Aims and methods in the study of vegetation.* (British Empire Vegetation Committee and Crown Agents for the Colonies, London.)
Turner, F., 1890. *Grasses of New South Wales.*
————, 1891. *Forage plants of Australia.*
————, 1895. *Australian Grasses.*
————, 1903a. The vegetation of New England, N.S.W. *Proc. Linn. Soc. N.S.W.*, **28**: 276-311.

————, 1903b. The botany of the Darling, N.S.W. *Proc. Linn. Soc. N.S.W.*, **28**: 406-442.
————, 1904. The botany of south-western N.S.W., *ibid*, **29**: 132-181.
————, 1905. The botany of north-western N.S.W., *ibid*, **30**: 32-90.
Turner, J. S., Carr, S. M., and Bird, E. C. F., 1962. The dune succession at Corner Inlet, Victoria. *Proc. Roy. Soc. Vict.*, **75**: 17-34.
Wace, N. M., 1967. The units and uses of biogeography. *Aust. Geogr. Studies*, **5**: 15-29.
Wagner, P. L., 1957. A contribution to structural vegetation mapping. *Ann. Assoc. Amer. Geogr.*, **47**: 363-369.
Warming, E., 1895. *Plantesamfund. Frundträk af den ökologiske Plantgeografic.* (Kjöbenhaun). German translation 1896 by Knoblauch; new German edition by Graebner, 1902.
Warming, E., 1909. *Oecology of Plants.* (Clarendon Press, Oxford.)
Weaver, J. E., and Clements, F. E., 1929. *Plant ecology*. 1st ed. (N.Y., McGraw-Hill.)
————, 1938. *Plant ecology*. 2nd ed. (N.Y., McGraw-Hill.)
Webb, L. J., 1958. Cyclones as an ecological factor in tropical lowland rainforest, North Queensland. *Aust. J. Bot.*, **6**: 220-228.
————, 1959. A physiognomic classification of Australian rainforest. *Journ. Ecol.*, **47**: 551-570.
Webb, L. J., Tracey, J. G., Williams, W. T., and Lance, G. N., 1967. Studies in the numerical analysis of complex rainforest communities. I. *Journ. Ecol.*, **55**.
Whittaker, R. H., 1951. A criticism of plant association and climatic climax concepts. *Northwest Sci.*, **25**: 17-31.
Williams, O. B., 1955. Studies in the ecology of the Riverine Plain. I. The gilgai micro-relief and related flora. *Aust. J. Bot.*, **3**: 99-112.
Williams, R. J., 1955. Vegetation regions (map and notes) in *Atlas of Australian Resources.* (Dept. of National Development, Canberra.)
Williams, W. T., 1967. The computer botanist. *Aust. J. Sci.*, **29**: 266-272.
Willis, J. H., 1961. Botanical Science in Victoria 100 years ago. *Trans. Roy. Soc. Vict.*, **73**: 41-46.
————, 1962a. *A Handbook to Plants in Victoria*, Vol. 1.
————, 1962b. Land flora of Victoria in *Comm. Bur. Cen. Stats.* Victorian Year Book 1962. **76**: 1-3 (Melbourne).
————, 1964. Vegetation of the basalt plains of western Victoria. *Proc. Roy. Soc. Vict.*, **77**: 397-405.
Wood, J. G., 1925. Selective absorption of chloride ions; and absorption of water by leaves in genus Atriplex. *Aust. J. Exp. Biol.*, **2**: 45-56.
————, 1933. Nitrogen metabolism of leaves of *Atriplex nummalarium*. *Aust. J. Exp. Biol.*, **11**: 237-252.
Wood, J. G., 1936. Regeneration of the vegetation on the Koonamore Vegetation Reserve, 1926-1936. *Trans. Roy. Soc. S. Aust.*, **60**: 96-111.
————, 1937. *The vegetation of South Australia.* (Adelaide).
————, 1939. Ecological concepts and nomenclature. *Trans. Roy. Soc. S. Aust.*, **63**: 215-223.
————, 1949. Vegetation of Australia in *The Australian Environment*. 1st ed. 77-96. (C.S.I.R.O., Melbourne.)
————, 1950. 2nd ed., pp. 77-96.
————, 1959. The phytogeography of Australia (in relation to radiation of *Eucalyptus*, Acacia, etc.) in A. Keast, *et al.*, (Eds.) *Biogeography and ecology in Australia.* (Den Haag) ch. xviii (Monographiae Biological, Vol. 8.).
Wood, J. G., and Williams, R. J., 1960. Vegetation of Australia, in *The Australian Environment*. 3rd ed., 67-84. (C.S.I.R.O., Melbourne.)

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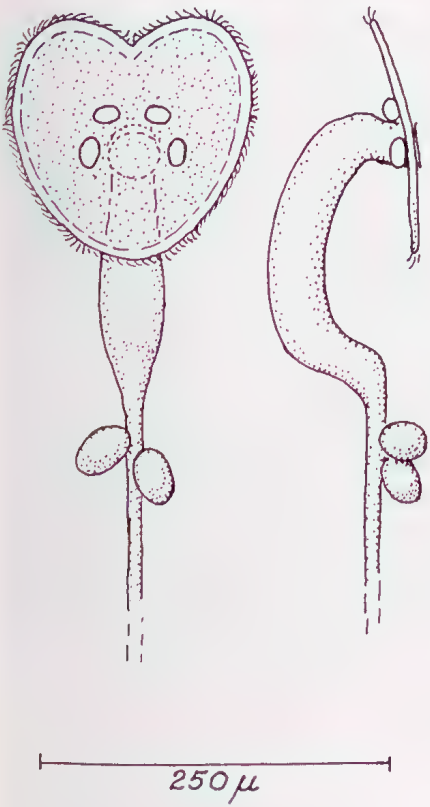
No. 9
Sinantherina

By H. A. Dade



Views of *Sinatherina*

Of the innumerable fascinating sights which delight the eye of the student of freshwater life, few can exceed in delicate beauty an active colony of the rotifer *Sinantherina*. A colony numbering about 150 individuals was found recently in the catch from a small pond at Benalla, and it continued to display for several days. The animals have a common anchorage, from which the stalks ("feet") radiate, their total height being 1500–1700 μ. The drawing shows front and side views of one of the individual rotifers. The heart-shaped corona, with its fringe of thrashing cilia, spreads out from the kinked expansion at the summit of the foot, and bears four oval, milky white bodies on its underside, round the mouth. Eggs are produced from organs on the foot, just below the expanded part. With the exception of the white bodies, the whole organism is quite hyaline and transparent. The colony is in constant movement as its members sway gracefully and turn their heads in search of food particles, and the feet contract now and then. Small spherical colonies of larvae

were seen: these eventually break up, but re-assemble at a common anchorage to begin their adult life. The species described is believed to be *S. socialis*.

Collections of microscopic aquatic organisms may be kept successfully for long periods in *very shallow* (3–4 mm. deep) pond water in 10 cm. Petri dishes, which admit light (avoid direct sunlight) while the glass lids prevent evaporation. These vessels are also the most convenient for observation, for with the lids removed they can be placed on the stage of the microscope and examined, by use of transmitted or strong top lighting, without disturbing their inhabitants. A very low-power objective (50 mm. is best) should be used, or better still, a dissecting microscope of Greenough or similar type. A small shoot of weed (*Elodea* is the best), will assist oxygenation and will provide footholds for those organisms which need anchorage. In these conditions such animals as *Hydra*, small larvae, protozoa of many kinds, and algae will thrive for many weeks; and *Daphnia, Cyclops* and related forms, and rotifers, as well as *Volvox*, for several days.

VICTORIAN ORCHIDS - No. 11

By C. E. Gray

Two Helmets

Autumn and winter are not plentifully endowed with orchid blooms, but the seeker who is undeterred by the weather may be rewarded in finding unusual specimens.

The tiny Helmet-orchids, five species of which are found in this State, appear during the wetter months. They are mainly denizens of damp, well-shaded spots. The most wide-spread are *Corybas dilatatus* (Veined Helmet-orchid) and *Corybas diemenicus* (Slaty Helmet-orchid).

Both have small roundish leaves—the former being, at ground level, about the size of a 10 cent piece; and the latter about the size of a 20 cent piece, usually quite flat on the ground. Each shows a central vein.

The two prominent floral segments are the dorsal sepal, forming the "helmet", and the large labellum. Flowers are solitary.

Slaty Helmet-orchid, *Corybas diemenicus*

The flower of *C. dilatatus* is carried on a short stalk. The edges of the

labellum are toothed, and there is a creamy raised area at the centre.

In *C. diemenicus,* the labellum is incurved and slightly serrated at the edge, with a pale centre. The flower appears to sit on the leaf as the stalk is almost lacking. Both flowers are predominantly red in colour, and both may be found in late winter.

Slaty Helmet-orchids may be found in damp, sandy places in eastern, western and southern Victoria. Veined Helmet-orchids range from the south-west to the far east of the State and occur occasionally further north. They favour coastal areas and mountain gullies, where they sometimes are seen growing on tree-fern trunks. Extensive colonies of either species may be found in favourable conditions.

Field Naturalists Club of Victoria

F.N.C.V. General Meeting— 11 September 1967

About one hundred and twenty members attended the meeting, which was chaired by the President, Mr. W. L. Williams. He emphasized a warning on the use of carbon tetrachloride in closed rooms, especially by juniors, as it is highly injurous to inhale.

Mr. Williams thanked Mr. McInnes for his splendid work for the Nature Show.

Mr. McInnes said that members should thank all the Show Cimmitee members, Mr. Fred Rogers, President of the S.G.A.P., and Sister Bowman and the Hawthorn junior members.

The total attendance at the Show was 7142, which was much greater than in previous years. It achieved its purpose in stimulating interest in Natural History.

The President stressed the wonderful work of those who grew the native plants. He announced the resignation of the Treasurer, Mr. N. McD. Taylor, which the meeting accepted with regret. Mr. D. McInnes offered to carry on until a new treasurer is appointed.

The Secretary, Mr. D. Lee, showed a book, "Wild Australia", presented to the club by Mr. and Mrs. Turner, of Surrey Hills, in memory of Mr. E. H. Coghill's work. The meeting expressed appreciation for this fine gesture.

The subject for the evening was "The Museum and the Community", by Mr. McNally. He explained that a museum had many meanings including that of a place of amusement; to absorb an atmosphere of learning; or to see what was available in other places. Centuries ago wealthy people collected objects of art or science; as time progressed they became virtually for public use, such as the Louvre and the Medici Galleries. Now we have public museums, often initiated by benefactors, or government supported, as in Australia, where some of our museums were modelled on the British Museum.

Mr. McNally outlined the various types of museums—Art, Technological, Natural History, Historical and Folk museums in each State. The Melbourne Museum began in 1854. The focal point is the collections, which are large and increasing all the time, must be properly housed, catalogued, looked after and increased. They are necessary for research and reference and there is a responsibility to display to the public and, and at various educational levels, to teach about the environment.

This educational function is increasing in importance. There are four Education officers to conduct parties coming by appointment and guide sheets are given to them. He emphasized the contributions by gifted naturalists who are not professional scientists.

The speaker paid a tribute to Professor Frederick McCoy, the first director, who obtained a building (later the Old Union) at the University of Melbourne in 1856. Previously the museum was in the Assay Department.

Professor Sir Baldwin Spencer in 1899 became the second director in the Russell Street building, and to him we owe the magnificent anthropological collection obtained when the Aborigines were still tribalized.

A future museum may be built on a Domain site obtained by the efforts of

Mr. R. T. M. Pescott. Mr. McNally outlined the variety of skills necessary in the museum; scientists in the museum and in the field, taxidermists, artists, guides, and some skilled in the knowledge and use of the ever-increasing kinds of plastics.

The speaker pointed out that there was a fascinating history of the museum, "Collections of a Century", by R. T. M. Pescott, published in 1954. The talk was illustrated by colour slides of buildings and fine dioramas in the museum, showing animals (mammals, birds and reptiles) in their natural environments.

Mr. Williams thanked Mr. McNally for the informative talk and the slides, which convinced us that the museum is one of our greatest possessions.

A discussion on the need to raise membership fees brought a motion by Mr. D. McInnes, seconded by Mr. A. Lewis, to increase the fees. This was carried.

Exhibits included Aboriginal artifacts, quartzite and tertiary fossil leaves brought by Mr. A. Morrison, and from Broken Hill siderite, chalcopyrites, feldspar, galena and calate, beryl, and silver lead ore and plant specimens: *Atriplex spongiosa, Zygophyllum fruticosulum* and *Pterocaulon sphacælatum*.

A gift from the Barrier Field Naturalists, with old numbers of their Naturalist Magazine, and "Plants of the West Darling" was acknowledged with appreciation.

Seven new members and two subscribers were elected.

New Members

The following new members were elected at the September General Meeting:

Mr. K. Edgar, Nareen, Vic., 3315.
Dr. J. G. Douglas, Lot 76 Sunhill Road, Mount Waverley, 3149.
Mr. Ernest Roy Busby (Life Membership), 62 Ardrie Road, East Malvern, 3145. (Interests: Botany, Geology and Micro.)
Mr. Robert William Cross, 5 Cushing Avenue, Bentleigh, 3204.
Mr. Max Longford, 12 Elster Avenue, Gardenvale, 3185. (Interest: National Parks.)
Mr. R. Gamon, 10 Roslyn Street, Brighton, 3186. (Interest: Natural history; 15 years member of Melbourne Walking Club.)
Winifred Walker, 35 Wanda Road, North Caulfield, 3161.

Mammal Survey Group

Mammals of the Metropolitan Area

In addition to the surveys being undertaken further afield, the Mammal Survey Group is commencing a survey of the mammals of the Metropolitan area. This will be based largely on locality records for mammals in the Melbourne suburbs, with attention being directed initially at the two possums common in Melbourne, the ringtail *Pseudocheirus lanuginosus* and the brushtail *Trichosurus vulpecula*.

The group therefore requests all F.N.C.V. members to help. Reports of sighting of either of these possums (or any other non-domestic mammal) would be greatly appreciated in expanding our records. All data will be plotted on a map of the Melbourne area. Specific details of localities are needed, so that they can be pin-pointed in a street directory, with details of date, time of day and surroundings.

Information should be sent to the Hon. Secretary, Mammal Survey Group, 36 Percy Street, Balwyn.

Marine Biology and Entomology Group Report—September 1967

The meeting was chaired by Mr. R. Condron, eleven members being in attendance.

Owing to the fact that several members of the Group were away on the F.N.C.V. trip to Broken Hill, the attendance was not as large as usual.

Mr. Condron made a few comments on the recent Nature Show, for which members of the Group had worked hard. Despite the lack of exhibits, the Group managed to muster quite an interesting display.

Mr. Condron then introduced the guest speaker for the evening, Mr. J. Barnes, Quarantine Officer, Agriculture Department, his subject being "Flies of the Gippsland Coastal Area". Mr. Barnes, Quarantine Officer, Agriculture members and showed that he had made a very close study of this branch of entomology.

The speaker displayed two cases of flies which he had collected in the Gippsland coastal area, and which contained several species. The anatomy of a fly was outlined, and Mr. Barnes stated that true flies have only one pair of wings.

He told us that there were approximately 80,000 species of flies distributed throughout the world, and went on to describe in detail some of the species which he had collected. At the conclusion of his talk many questions were asked by members and a vote of thanks was moved by the chairman.

EXHIBITS

For the benefit of any members who had been unable to attend the Nature Show, Mr. Strong showed a beautifully arranged collection of shells of the Port Phillip area, the work of Miss Madge Lester. He also showed under a wide-field stereoscopic microscope a small piece of rock on which was a species of bryozoa, *Spirorbis*, one of the smaller mason worms, and three other species of tube worms, unidentified. Also once again for the benefit of members who

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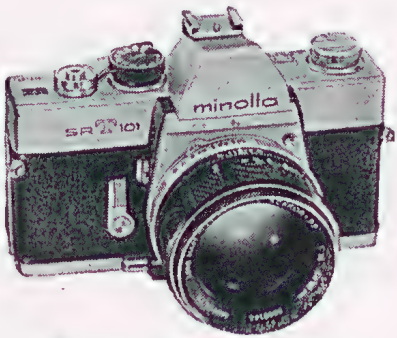

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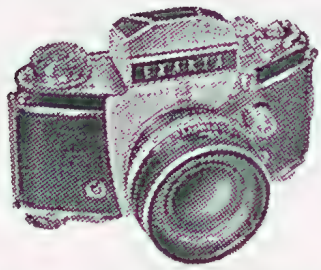
had not attended the show, he showed under microscopic power two slides which had been on display at the show, and had been taken from the Club slide collection: the cornea of compound eye of a drone fly, and the eggs of a moth.

Miss Jenny Force exhibited a case of beetles collected from various parts of Australia, and Mr. Collier, a visitor, showed a fly which Mr. Barnes said was of the Rutilid family,

Geology Report—6 September

Eighteen members and visitors attended, with Mr. Davidson again taking the chair in the absence of Mr. Dodds. The subject for the evening was a talk by Mr. D. Nichols, a micro-palaeontologist of Melbourne University, and his lecture was entitled: "Oil Exploration and Its Methods". He began by saying that oil is always associated with sedimentary rock, and its origin is believed to stem from sediments containing much animal and vegetable matter. The speaker pointed out that a gram weight of some types of sediments may contain two to three thousand micro-fossils and the study of these was important in locating the most suitable oil-bearing zones. The first step taken is seismic exploration to plot boundaries of sedimentary basins and domes and fault traps likely to contain oil. Then the most suitable drilling site is located and drilling begins. Coring bits are used and, as the bore deepens, a greater overhead pressure occurs which normally counters natural pressures from below, such as natural gas. If, however, this is insufficient, mechanical devices called blow-out preventers are used to shut off the increased pressure until the static head is increased. The static head is usually kept high, with a mud containing a heavy mineral such as barytes.

The speaker said that the oil-bearing zones in Bass Strait are a southerly extension of the Latrobe Valley coal measures. At the Halibut well the top of this zone is 7,500 feet below the surface and is 400 to 500 feet thick. He gave details of all known oil and gas deposits in Australia and the large number of questions asked indicated the in-



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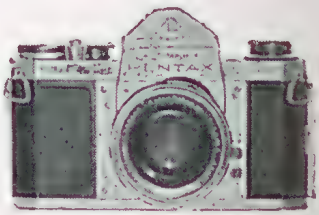

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terest taken in his very informative talk. Mr. Nichols was thanked by Mr. Davidson on behalf of the Group.

EXHIBITS

Mr. Francis—Dolomite, Cinnabar, Chalcanthite, Baryted-calcite, Pumice, Barytes, Haematite, Beryl, Travertine, Semipal, Phosphate rock, Muscovite, Mispickel, Common Opal.

Mr. Whatmough—Bore Core, Tertiary, 139-ft. level, Sewerage Works, Ormond.

Mr. Bairstowe—Volcanic rock, Mt. Vesuvius, Italy. Mica, Gurdar, India. Garnets, Africa. Copper Ore, Prokuplic, Yugoslavia.

Botany Group Report—14 September

Mr. B. Fuhrer took the chair and 19 members were present. An apology was received from Mrs. Webb-Ware.

There was a discussion of the recent Nature Show, with reports on public interest in the group's exhibit on seaside plants. Mr. Fuhrer suggested "Rushes and Sedges", two interesting but neglected families of plants, as our subject for the 1968 show. "Pollination of Plants by Insects" was also suggested, but after some discussion "Rushes and Sedges" was decided upon, with the idea of possibly dealing with other monocotyledonous families such as Liliaceae, Amaryllidaceae and Iridaceae the following year.

The subject for the evening was "How to recognize and remember plants", which was given by Mr. Fuhrer. He stressed the importance of really studying the appearance of the plants both in the field and under the pocket lens and the microscope, photographing them in their habitats, reading botanical books with descriptions, line drawings and other illustrations, and doing these things again and again, and gradually a facility for quick identification is developed. Another aid was the collection, pressing and labelling of plant specimens, which should be kept in a systematic way and constantly referred to. Mosses, which appear to the casual observer to be very much alike, are, he said, very differentiated when the various species are studied, and he showed a series of excellent colour slides of these to prove this.

Mr. F. Zirkler gave a brief report of the last excursion to Mr. Belcher's property, "Lilydale Park", at Batesford, which was very much enjoyed by those who attended. An excursion committee, consisting of Mr. R. Filson, Miss M. Allender and Mr. Zirkler, with Mr. Fuhrer ex officio, was appointed, and a trip to the Brisbane Ranges on 8th October was arranged. The meeting place will be Batman Avenue at 9.30 a.m. (private transport).

Corrections to last Botany Group Report

Line 6: Mt. Stuart; line 7: Katherine Gorge, where scenes of the film "Jedda" were filmed; line 9: *Ptilotus, Calandrinia*; line 12: Australian Natural History Medallion; line 23: Mrs. Edith Coleman; line 28: Ichneumonid wasp, *Lissopimpla*, of; line 38: Mr. P. Uhlherr; line 44: lichens.

Photoflora '68

Nature photographers are invited to participate in Photoflora '68, the fifth photographic competition and exhibition organized by the Native Plant Preservation Society of Victoria.

Entries of 35 mm. colour transparencies are invited in the following sections:

A. Victorian wildflowers, excluding orchids.
B. Victorian orchids.
C. "In the bush with a camera."
D. Australian wildflowers not normally found in Victoria.

Trophies will be awarded in each section.

Entries close on 5th February, 1968, and entry forms with full particulars are obtainable from the Competition Secretary, Miss B. C. Terrell, 24 Seymour Avenue, Armadale, 3143.

Public screenings of accepted slides will be held in March and April, 1968, at Albury, Bairnsdale, Bendigo, Boort, Geelong, Hamilton, Launceston, Mansfield, Melbourne, Mildura, Mornington, Morwell, Ringwood, Shepparton and Warrnambool.

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A Word from the Treasurer

During 1966, the Council of the F.N.C.V. decided that it had become essential that paid professional assistance was needed to cope with the increasing amount of work which was being handled by the treasurer and his assistant.

As an increase in expenditure was inevitable, Council made provision to partly cover this for the year 1967. During the year however, the magnitude of this increase became more apparent, and the Council proposed a new scale of subscriptions that would cover it.

The new subscription rates were placed before the September General Meeting of the F.N.C.V., and after discussion were approved and adopted as from 1st January 1968.

As country members and subscribers as well as ordinary members will be asked to bear the increase, a few words may not be amiss about our main link with our country colleagues—*"The Victorian Naturalist"*.

Our editor endeavours to make *The Naturalist* a quality magazine, that offers reading for the scientific expert, and the newcomer to natural history. (Not an easy task). Quality however costs money, and *The Victorian Naturalist* for 1967, for which you have paid $4.00, will in fact cost $5.00 to print and post to you. The March issue of 48 pages cost 90 cents per copy to print and post. Of course, some of this extra cost is covered by generous grants (for mammal and bird articles) from the Ingram Trust, but an amount will also be seen reflected in the deficit for the year 1967.

I sincerely hope that these few words help soften the blow as you write your cheques for the new 1968 subscriptions, which are shown below.

D. E. McINNES,
Treasurer F.N.C.V.

SUBSCRIPTIONS, 1st JANUARY 1968

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The Victorian Naturalist

Editor: G. M. Ward
Assistant Editor: W. White

Vol. 84, No. 11 11 November, 1967

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Front Cover:

The Brolga, or Native Companion, was quite common in Victoria in earlier times; but like the Bustard, has been driven away by the advances of settlements. It also has the distinction of being Australia's only representative of the Crane family. The photograph was taken by Graham Pizzey.

close to nature

How many of us realize just how close we are to nature; and with what little effort it can be studied?

From the fluttering moth at a lighted window, to the spiders in the darkest corner of our garden shed; the wonders of the natural world are numerous—to the careful and patient observer!

This is a series in which a look is taken at some of these creatures which make up this "world in the garden". The aim is not to provide a completely scientific treatise on each subject; but rather to provide enough general detail to stimulate an interest in the things around us.

If the series encourages us not only to look; but to see something in what we are looking at, then it will have served its purpose.

The present spell of warm weather has brought with it, earlier than usual, one of the most fascinating members of the order of true flies (Diptera). It is one in which the powers of flight have reached a remarkable stage of perfection; and during these warmer days, the fly may be seen busily engaged about the various flowering shrubs in the garden.

This insect which intrigues me so, and which has very likely had the same effect on many readers, is a member of the family of Hoverflies (Syrphidae).

With its striking black and yellow barred abdomen, and unmistakably large compound eyes, it hovers above a particular plant with wings invisible, save for the blur of speed as the sunlight catches their gauzy surface. One unintentional movement on the part of the watcher, and the insect disappears—to re-appear three or four feet away, either above or to one side.

The members of this family are quite diverse in their form, coloring, and habits; but the one described is one of the assets of the garden.

The larva of *Syrphus viridiceps* feeds on aphids voraciously. In fact in this regard it almost equals the well known lady-bird and its larva. The coloring of this maggot is generally of pale-green, with a lighter stripe running lengthwise along the back.

The feeding aphids are approached while feeding; one is singled out by the larva, secured by the mandibles, and held until the juices have been extracted. The empty body is cast aside, and the process repeated until the larva has satisfied its appetite.

The larva pupates in its final larval skin, which becomes the *puparium*, and is usually attached to a leaf of a plant.

Another species, *Eristalis tenax*, is remarkably like the hive bee in appearance, but which of course, on closer inspection, may be distinguished from the latter due to there being only two wings instead of four. The larva of this introduced Drone-fly, is commonly called the "Rat-tailed Maggot". A full account of this species may be read in the *Vict. Nat.* **82**, 49-51.

Other species of Hover-fly are quite small and would almost certainly be overlooked unless one was searching deliberately for them.

Having always noticed these garden Hover-flies only during their hours of seemingly unending activity, I was interested to know where and when they rested. This answer (at least for myself), was provided quite by accident.

Recently, I was idly shining a torch beam amongst the foliage of one of the trees of the garden, in this case the Willow-leaved Peppermint (*Euc. nichollii*), when my attention was drawn to several individual leaves.

At left—Here can be seen the striking markings on the abdomen.

Below is shown a more normal resting position of the Hover-fly.

On each rested a fly, ready for immediate flight.

Here in fact were the "resting" Hover-flies; and although this was night time, their reflexes were apparently not very much reduced in speed from the split-second actions of daylight hours.

And for those readers who have as yet not seen these masters of aerobatics, look for them during the summer months, hovering and darting in the sunlight; and very likely you may wonder as I have—do these flies gain as much pleasure from doing these manoeuvres, as I gain from watching them?

The large compound eyes may be seen to form almost the major part of the head of the fly. Note also the characteristically shaped antennae, terminating with a bristle.

Photos: G. Ward

VICTORIAN ORCHIDS
No. 12

Greenhoods in General

By C. E. GRAY

In the flush of Spring flowers, many orchids appear, their interest being more in the unusual flower forms than in colour. Green flowers are always unusual, and to come upon a large colony of one of the greenhood species is one of Springtime's joys. The Nodding Greenhood (*Pterostylis nutans*) so widespread in cooler parts, is one of the early Spring products. With its rosette of ground-level leaves surrounding the flower stalk and head bent forward, it is hard to mistake. Many other members of this large and diverse genus are not so easily distinguished.

Just how diversified the genus is may be seen from the following list of variations:

(1) flowers may be green, brown, or whitish, with any combination of these components;

(2) flowers may be solitary, several or many;

(3) the joined lateral sepals may be bent up to embrace the flower, or down to reveal the interior;

(4) leaves may be present or absent at flowering time;

(5) leaves may be in a rosette circling the stem, or on a separate stem, or appear as stem leaves up the stem (one species in Victoria—*P. barbata*—has a rosette of many layers of leaves which grow up on to the stem making quite a dense tuft);

(6) there are greenhoods in flower throughout the year.

The characteristic hood is formed by the lateral petals and the dorsal sepal in conjunction. The lateral sepals are joined in front of the flower. There are 38 Greenhoods recorded for Victoria.

Nodding Greenhood *Pterostylis nutans*.
Photo: Author

Studies of Soil Seed in Snow Gum Woodland

(*E. pauciflora* Sieb. ex Spreng var. *alpina* (Benth.) Ewart)

Truda Howard and
D. H. Ashton*

The brief survey of soil seed in Victorian plant communities carried out by the senior ecology class in 1965 was continued in 1966 with a detailed study of soils from sub-alpine woodlands of *E. pauciflora* var. *alpina* at an altitude of 4700 feet at Lake Mountain, Victoria. The primary aim of the study was to investigate the variation of germinable seed with depth in an unburnt stand and to make a limited comparison with that in an adjacent stand that had coppiced following the 1939 bushfires.

The stands and general environment

The unburnt stand consisted of well-spaced trees 30-40 feet high with flat-topped crowns and trunk diameters of 2-3 feet. The floor of the stand was grassy and consisted largely of *Poa australis* var. *alpina* and var. *latifolia*. Dicotyledonous herbs such as *Viola hederacea* Labill., *Hydrocotyle hirta* R.Br. and *Oreomyrrhis andicola* Endl. were abundant, but low shrubs such as *Hovea longifolia* A. Cunn. and *Oxylobium alpestre* F.v.M. were widely scattered although still conspicuous. The burnt stand carried a continuous canopy with thin coppiced stems 20-25 feet high. The grassy floor was similar to the unburnt stand but the shrub layer consisting of *Oxylobium alpestre* and *Helichrysum thyrsoideum* (D.C.) Willis and Morris was better developed in spite of recent dying out of the composite component. The alpine humus soils of the area are generally thin and the rhyodacite parent material may occur anywhere up to 2-4 feet below the surface. The friable loamy top soils to depths of 12-18 inches are very high in organic matter (10-25%) and the sub soils are yellow to brown sandy clay loams. The climate of Lake Mountain is characterized by reliable high rainfalls of about 75 inches per year, of which perhaps one-third falls as snow. The summers are mild and the winters very cool.

* Botany School, University of Melbourne.
The work was carried out by the following final year B.Sc. students: P. B. Adams, J. Amos, D. J. Chalmers, Kay Dixon, O. A. Gyles, Margaret Heppel, J. Hill, Truda Howard, R. King, J. E. Ong, J. Osborne, A. Pyliotus, P. Saenger, Kath Stringer, F. G. Swindley, G. K. Thomason, R. Zitkevicius. W. D. Incoll, G. L. Morrison, R. O. Squire and A. A. Thornley were final year students of the Forestry School.

Methods

Soil was carefully excavated from six random sites each measuring 7½ x 10 inches in each stand in early March 1965. In the unburnt stand layers of soil were cut from excised blocks at depths of 0-1, 1-2, 3-4, and 6-7 inches, thus reducing contamination to a minimum. In the burnt stand it was only possible to collect the surface one inch due to the limited time available. All samples were sieved of roots, rhizomes, corms, tubers and rock in the laboratory, and after thorough mixing, divided into two sub-samples of equal weight. One half was placed over seed-free sand in 8 inch pots in the glasshouse, whilst the other half was given a preliminary stratification at 2°C for 4 weeks. The soil was kept moist from April 1965 until February 1966, and seedlings were counted and removed as they could be identified. After about 3 months, when the main flush of germination had passed, the soil was turned over. Very little further germination occurred in either treatment in the subsequent 9 months, hence the experiment was terminated in February 1966. Species occurring within 5 feet and 20 feet of each collection site were noted for comparison with germination data.

Results and Discussion

The data are summarized in Tables 1 and 2 and are expressed as both the mean number of seed germinating per square foot and the frequency of occurrence of the species in the 6 sites. The mean density of germinable seed is 151 per square foot from 0-2″ in the unburnt Snow Gum stand and is therefore very similar to that obtained for some wet Messmate (*E. obliqua*) forests over the same depth (Carroll and Ashton, 1966). The density of seed in the top 1 inch of soil in the stand burnt-over in 1939 is however only 23% of that in the unburnt stand. The reason for this great reduction is obscure: it is possible that seed stored in the surface inch of soil was either destroyed by the fire or subsequently induced to germinate, but because of the increased competition for light and moisture caused by the continuous tree cover many of the species have not yet been able to make significant additions of seed to the soil. The effect of stratifying the soil was unexpectedly inconclusive. The aggregate of all species showed that the stratified samples had a germinable seed density of 99% of that of the controls in the top inch of soil and a value of 80-90% in the lower layers. Both *Oreomyrrhis andicola* and *Poa australis alpina* showed improved germination density following stratification of the mature stand soil, but these trends were exactly reversed in the soil of the younger stand. In view of the fact that no statistical differences could be established between the treatments for any of the species or aggregates of them it was decided to combine all results for each depth in Tables 1 and 2. The apparent lack of need for cold treatment in these results suggests that the seeds were already stratified by the snow blanket of winter or by chilling of the soil on cool nights in summer.

One of the most conspicuous results is the sharp decrease in germinable seed with depth. Such a relationship has been reported from various parts of the world by many workers (quoted in Major and Pyott, 1966). In the mature Snow Gum woodland it is estimated that 83% of the total seed to a depth of 7 inches is found in the topmost inch. This is probably a direct reflection of the recent net additions of seed to the soil surface, and is probably very much influenced by the quantitative floristic composi-

tion of the immediate summer's seed crop. The density of seed from 1 to 7 inches is uniformly low. Species such as *Hydrocotyle hirta, Oreomyrrhis andicola, Hypochoeris radicata,* L., *Luzula campestris,* (L.) D.C. in Lam. and D.C., *Carex breviculmis* R.Br. and *Poa australis alpina* show a very great reduction in density below one inch depth, whereas species such as *Asperula gunnii,* Hk.f., *Oxalis corniculata* L. and *Gnaphalium purpureum* L. are more uniformly distributed with depth. The seed of common species such as *Poa australis* was found to be very local in distribution suggesting that collection of seed into caches by insects such as ants or bugs had occurred. (Wheeler, 1926; Grose, 1960). Major and Pyott (1966) rightly point out that the floristic composition of the soil borne seed is an integral part of the total potential flora of an area. A comparison of the floristic frequency of species of germinable seed with the frequency of living plants within 5 feet and 20 feet of the collection sites shows some interesting features. The incorporation of seed into the soil at a particular site will depend on the quantity of seed produced, its viability, dormancy, longevity, the vulnerability to parasites and consumers, and the ease of its dispersal. In some cases the frequency of occurrence of the seed species in the soil is well correlated with the frequency of parent plants in the vicinity, e.g. *Oreomyrrhis andicola, Hypochoeris radicata, Asperula gunnii,* and *Poa australia* agg. and in the young stand, *Hydrocotyle hirta.* A conspicuous number of species which are dominant or frequent in both stands are completely absent from the soil samples. These include *Eucalyptus pauciflora* var. *alpina, Oxylobium alpestre, Lagenophora stipitata* and in the burnt stand *Stylidium graminifolium* Swartz and *Ranunculus hirtus* Bks. p. Sol. It is likely that rapid destruction of seed by insects, birds and mammals is important, although poor seed set and low viability may be a contributing factor. It is known that ants harvest eucalypt and grass seeds from the soil and that insect larvae destroy seed of many species on the plant. On Mt. Howitt for example, the embryos of 50% of seed collected from *Hovea longifolia* bushes had been destroyed by larvae.

Several species were recorded with high frequency in the soil but were absent or extremely rare in the stands. These species included *Luzula campestris, Carex breviculmis* R.Br., *Oxalis corniculata,* and in the unburnt stand, *Hydrocotyle hirta.* It is possible that these species were either previously present in high numbers on the stands or else they have an efficient means of dispersal from more distant sites.

The species with the greatest density of germinable seed in the soil were *Oreomyrrhis andicola, Hydrocotyle hirta,* and *Luzula campestris.* In general all the germinable species were herbaceous—the only woody species was a single germination of *Hovea longifolia.*

The exact means by which species are incorporated into the soil is varied. It is possible that it may occur by seed drifting into the friable top soil in dry weather, by burial due to disturbances of animals or by the storage and abandonment of seed in galleries by insects such as ants. The soil storage of seed is of considerable importance in the plant community following the advent of fire or wind throw. The composition of the colonizing species after catastrophes or disturbance may depend as much on the storage of seed in the soil as on the current seed crop.

References

Carrol, E. J., and Ashton, D. H., 1965. Seed storage in soils of several Victorian plant communities. *Vict. Nat.* **82**: 102-110.

Grose, R. J., 1960. The silviculture of *Eucalyptus delegatensis*. Ph.D. thesis, Melbourne University.

Major, J., and Pyott, W. T., 1966. Buried, viable seeds in two California Bunchgrass sites and their bearing on the definition of a flora. *Vegetatio* viii, 253-282.

Wheeler, W. M., 1926. Ants, their structure, development and behaviour. New York, Columbia University Press.

Table 1

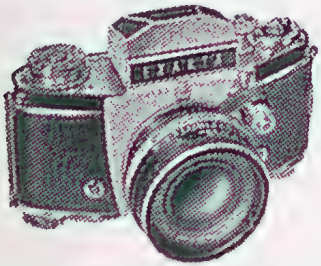
UNBURNT STAND

Species	Occurrence in 6 sites				Density germinable seed per sq. foot			
	living plants		germinable seed					
	5 ft radius	20 ft radius	0–1″	1–7″	0–1″	1–2″	3–4″	6–7″
Eucalyptus pauciflora alpina	3	4	–	–	–	–	–	–
Oxylobium alpestre	1	3	–	–	–	–	–	–
Lagenophora stipitata	3	4	–	–	–	–	–	–
Helichrysum sp.	1	3	–	–	–	–	–	–
Prasophyllum suttonii	1	1	–	–	–	–	–	–
Ranunculus hirtus	–	2	–	–	–	–	–	–
Oreomyrrhis andicola	6	6	6	4	37·6	1·1	0·3	0·9
Viola hederacea	5	6	–	5	0·2	0·4	0·4	1·0
Poa australis alpina	6	6	3	2	1·9	–	0·2	0·5
P. australis latifolia	6	6	3	–	0·7	–	–	–
Senecio quadridentatus	4	5	2	–	0·2	–	–	–
Hypochoeris radicata	4	4	6	2	7·6	0·2	0·2	0·2
Asperula gunnii	4	4	3	3	0·6	0·6	0·2	0·4
Hovea longifolia	1	1	1	–	0·2	–	–	–
Stylidium graminifolium	1	2	–	2	–	0·2	0·2	0·2
Danthonia setacea	–	3	–	1	–	0·2	–	0·2
Luzula campestris	–	1	6	5	26·5	2·4	0·3	0·2
Rumex acetosella	–	2	1	1	3·4	1·1	0·2	–
Hydrocotyle hirta	–	1	4	2	50·6	0·2	–	1·8
Gnaphalium purpureum	–	–	3	2	1·5	0·2	–	0·2
Carex breviculmis	–	–	6	6	6·6	1·1	1·3	1·1
Cerastium glomeratum	–	–	2	–	0·8	–	–	–
Oxalis corniculata	–	–	5	6	1·4	1·4	4·2	2·7
Cotula filicula	–	–	1	–	0·8	–	–	–
Agrostis sp.	–	–	1	1	0·3	0·2	–	–
Vulpia bromoides	–	–	3	1	0·5	0·2	0·2	–
Scirpus antarcticus	–	–	–	2	–	0·3	0·5	0·2
Halorrhagis tetragyna	–	–	–	2	–	0·5	0·2	–
Epilobium glabellum	–	–	–	1	–	–	0·2	–
Juncus (pauciflorus?)	–	–	–	1	–	0·2	–	–
TOTALS					140·6	10·5	8·6	9·6

Table 2

1939 BURNT STAND

SPECIES	Occurrence in 6 sites: living plants 5 ft radius	Occurrence in 6 sites: living plants 20 ft radius	Germinable seed	Density germinable seed per sq. ft. 0–1 inch
Eucalyptus pauciflora alpina	–	4	–	–
Oxylobium alpestre	5	6	–	–
Stylidium graminifolium	6	6	–	–
Ranunculus hirtus	3	4	–	–
Poa australis alpina	6	6	2	8·8
P. australis latifolia	6	6	1	0·2
Oreomyrrhis andicola	6	6	6	7·7
Hydrocotyle hirta	6	6	6	5·7
Viola hederacea	4	6	3	2·2
Asperula gunnii	5	6	4	2·2
Luzula campestris	1	1	6	2·2
Oxalis corniculatus	–	–	4	1·4
Carex breviculmis	–	–	4	1·1
Vulpia bromoides	–	–	1	0·3
Scirpus antarcticus	–	–	1	0·3
TOTALS				32·1



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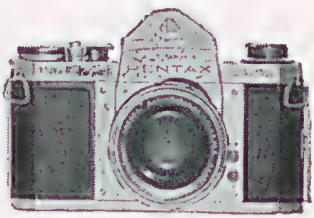

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Notes on the Vegetation of the Ninety Mile Beach (Long Island) at Lakes Entrance

By V. N. Jernakov

The Ninety Mile Beach is one of the most interesting geographical phenomena in Gippsland. It especially attracts naturalists, who can find here, special coastal and sand dune plants.

The author had the opportunity to visit the Ninety Mile Beach (Long Island)* opposite the Lakes Entrance Township, 200 miles east of Melbourne, and to collect plants and make some observations (Fig. 1).

The result of these observations is presented in this paper.

In Prof. Hills' book, "The Physiography of Victoria" (1960, pp. 230-232), we find this description of the Ninety Mile Beach:

"The Victorian coast along the Ninety Mile Beach, from Corner Inlet eastwards, affords an excellent example of a coastline of submergence. Commencing east of Tarraville, the coast is formed by a long sand ridge behind which is a narrow lagoon, parts of which have been silted up, forming swamps. Behind the lagoon again, is an earlier coastline, which was formed when submergence first took place. . . . The sand ridge forming the present coast is an off-shore bar. It was built up by the attack of the breakers some distance off the former shore, on the gently-shelving, gravelly and sandy sea floor produced by the submergence of the seaward edge of the East Gippsland Plain."

Long Island extends from north-east to south-west.

The length of the island (from entrance to former natural outlet), is about four miles, with the width fluctuating from 500 to 1000 feet. The average height of Long Island is about 25 feet above sea level; and the western part is approximately 30 feet, and in the eastern part about 15 feet. The highest points in the western part rise about 35 feet, near where the Pilot Station stands, and the footbridge.

* This part of the Ninety Mile Beach on Broadbents' map No. 185 is called Long Island. In future we shall use only this name.

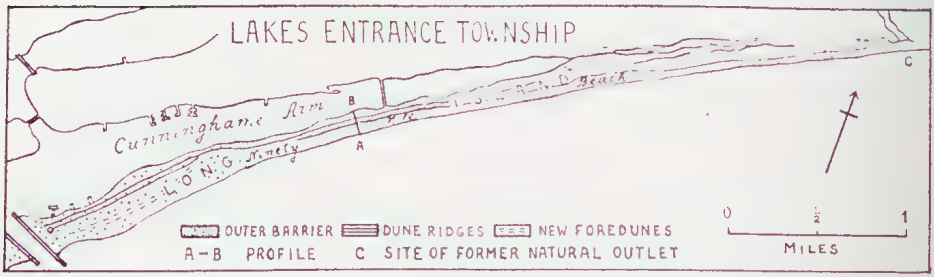

Fig. 1. A schematical map of Long Island.
Drawing: Author

Long Island is connected with the township of Lakes Entrance by a footbridge, opposite which there are buildings and a crossing for the people to the seashore. Here, the dune is fenced by wire (about one mile) to prevent damage to it.

Near the Pilot Station on the northern shore, are situated jetties and about a dozen houses. Along the front of the houses are planted eucalypts, cypresses, and pines (*Pinus radiata*).

Between Lakes Entrance township and Long Island, flows salt water—Cunninghame Arm (Reeves River)—with an average width of about quarter of a mile. The natural outlet of the Arm was about three miles east of the footbridge, and is now non-existent; having been filled by drifting sands. The entrance to the ocean is an artificial one opened to shipping in July 1889.

The eastern part of Cunninghame Arm is being gradually overgrown by Sea Rush (*Juncus maritimus*).

The seaward side of the island has a straight line, while the landward side to the Cunninghame Arm is slightly curved.

The climate of Lakes Entrance is mild and maritime. In autumn and winter, it is about 10 degrees warmer than it is in Melbourne. The average annual rainfall at Lakes Entrance is 28.96 inches.

Long Island consists of dunes which stretch along the shore, and the top of the dunes has a more or less rounded shape. Sometimes blowouts and depressions are found.

The off-shore bar, or outer barrier as we are calling it here, has a steep slope (40°) to the Cunninghame Arm and a gentle slope (20°) to the ocean, ending in a wide beach consisting of fine pale yellow iron-oxide stained quartz sand, and covered by shells. Between 5% and 10% of the sand consists of shell fragments (mainly calcium carbonate). (Bird, 1965.)

The summit of the outer barrier and its slope to the Cunninghame Arm, are covered by dense and luxuriant vegetation, especially in the north-western part of Long Island. The vegetation consists of trees, shrubs, lianas and herbaceous plants. The trees reach about 35 feet in height. Those growing on the southern open slope have trunks and branches curved towards the mainland—the result of southerly and south-westerly winds blowing from Bass Strait. At the end of December some of the shrubs and herbaceous plants were in bloom.

Of wild animals, only rabbits were recorded.

Almost all the northern slope of the main dune (from the Pilot Station to the footbridge) is covered by trees, dominated by Coast Banksia (*Banksia integrifolia*), which forms the upper storey, and reach 35 feet in height, with trunks two and a half feet in diameter. One tree had a diameter of four feet. Some of the trees are covered by sand, and therefore it is rather difficult to determine their real height.

The next storey consists of Mountain Pepper (*Drimys lanceolata*) up to 18 feet high, which form a dome-shaped crown. Coast Tea-trees (*Leptospermum laevigatum*) growing in groups reaches a considerable size, up to 12 feet high, and 9 inches trunk diameter. Both species are very abundant.

Coast Wattle (*Acacia longifolia var. sophorae*) also grows here, reaching the height of a man, and is important in the stabilization of coastal sand dunes.

In addition, the following may be observed—Coast Beard-heath (*Leucopogon parviflorus*), lonely specimens

of Coast Daisy-bush (*Olearia axillaris*) which reaches 6 feet in height with trunks 3 inches in diameter, and small solitary trees of Coast Everlasting (*Helichrysum gunnii*) of similar height.

Sea-box (*Alyxia buxifolia*) in full bloom, reaches 7 feet in height and grows in groups, mostly near the shore. Single African Boxthorn (*Lycium africum*) are seen, reaching a height of 11 feet. Seaberry saltbush (*Rhagodia baccata*), and Hazel Pomaderis (*Pomaderis aspera*) also have been recorded.

On the open space on the foredunes and dunes, especially on the southern slopes, grows a noteworthy shrub peculiar to sand dunes—the Cushion Bush (*Calocephalus brownii*), which forms very dense rounded silver-white clumps up to 5 feet high and 7 feet across, with small to minute white linear leaves flat against the stems (Fig. 2). On the sand were clearly distinguished the carmine flowers of the Angular Noon-flower (*Carpobrotus acquilaterale*), which is only 7 inches in height and grows in small clumps. Here can be found a few specimens of Coast Groundsel (*Senecio spathulatus*) up to 15 inches high.

The top and the southern slope of the foredunes are abundantly covered by Hairy Spinifex (*Spinifex hirsutus*) and introduced Marram Grass (*Ammophila arenaria*). The latter grows in tussocks up to four feet high, with here and there bare places of several square feet between them.

On Long Island there is a special plant nursery growing bulk supplies of Marram Grass—a very effective sand-binder for use in local beach reclamation.

In several parts of the island the Soil Conservation Authority has planted Marram Grass on the dunes and such places are fenced (Fig. 3). Only on the extreme north-western part of the island are there small areas of sand without vegetation.

Traces of old tree felling, mostly of *Banksia integrifolia*, can be found in the north-western part of the island. In these places grow Austral Sarsaparilla (*Smilax australis*), Small-leaf Clematis (*Clematis microphylla*), Climbing Lignum (*Muehlenbeckia adpressa*) and Dolicos (*Dolicos lignosus*). *Smilax australis* trails on the sand and on the fallen trunks and branches. Weeds represented were: Curled Dock (*Rumex crispus*), and Purple Groundsel (*Senecio elegans*).

FIG. 2. *Calocephalus brownii* growing on the foredune. *Photo:* Author

FIG. 3. *Ammophila arenaria*, an effective sand binder planted on dunes.

Photo: Author

On the schematic profile of Long Island (Fig. 4), made about 700 feet to the west of the footbridge, can be seen the distribution of the vegetation on the sand dunes. For approximately 300 feet from the shore, the beach is covered by shells, and then begins foredune about 14 feet high and 100 feet wide. On the foredune first vegetation appears, and comprises *Ammophila arenaria* and *Spinifex hirsutus*, between which are scattered *Calocephalus brownii* and *Senecio spathulatus*.

Between foredune and the main dune there is a hollow about 70 feet wide. The main dune has a width of 80 yards. On the gentle southern slope of this dune may be found *Ammophila arenaria*, Bidgee-widgee (*Acaena anserinifolia*), *Carpobrotus acquilaterale*, *Senecio spathulatus*, *Calocephalus brownii*, *Olearia axillaris*, and *Helichrysum gunnii*.

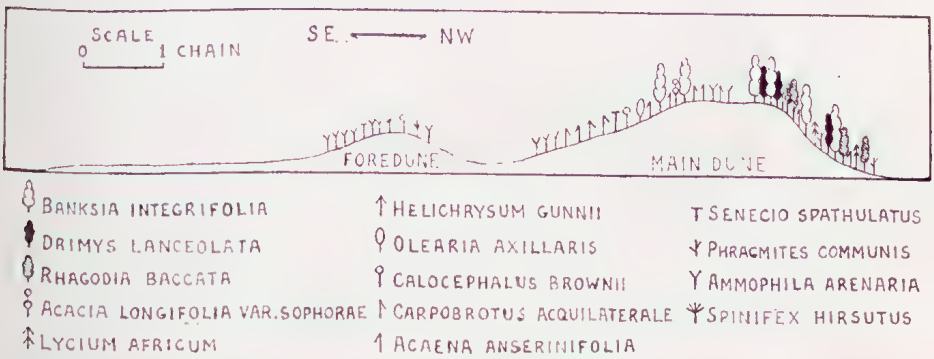

FIG. 4. A schematical profile of Long Island showing distribution of vegetation. The profile was made to the west of footbridge.

Drawing: Author

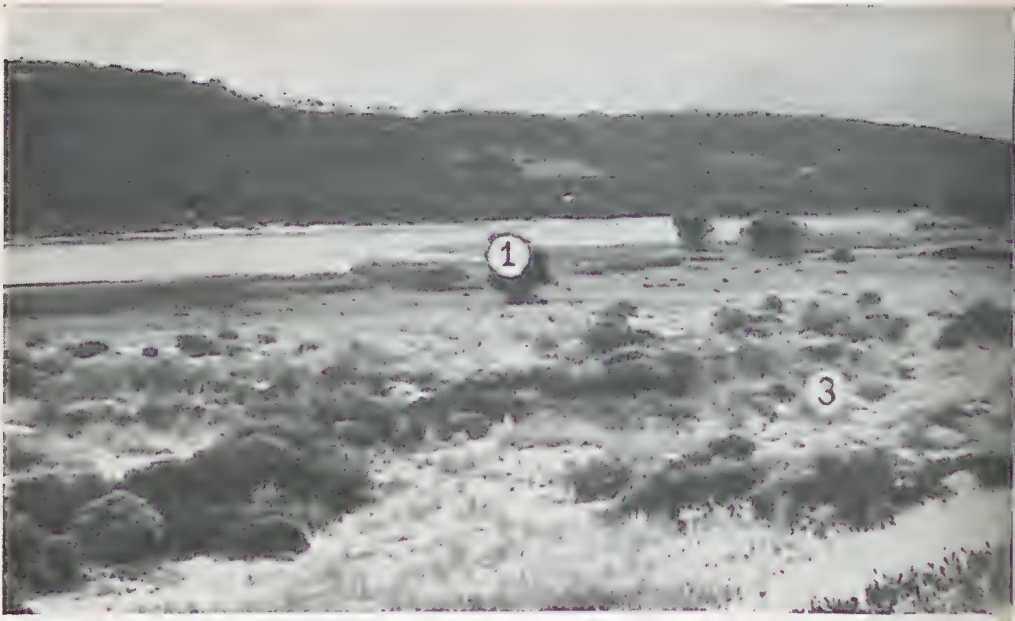

Fig. 5. A view eastwards from footbridge along the outer barrier at Lakes Entrance, looking towards Red Bluff with Cunninghame Arm on the left.

On the top grows *Banksia integrifolia, Acacia longifolia var. sophorae,* and *Drimys lanceolata.* On the steep northern slope are found *Banksia integrifolia, Rhagodia baccata, Lycium africum.* Then occurs a flat strip of shore (about 50 feet wide), where grows *Banksia integrifolia* and *Lycium africum.* Over these climb *Smilax australis, Muehlenbeckia adpressa* and *Dolicos lignosus.* The Common Reed (*Phragmites communis*) can also be found here. The soil is richer in humus than on the southern slope or on the top of the dune, and therefore the vegetation is more luxuriant. The whole strip between sand, beach and dune is covered with dry leaves, branches and cones.

The main dune is sharply distinguished from the foredune by colour. While the foredune has a slightly green-grey colour, the main dune has a green tint with lighter coloured spots.

The eastern part of Long Island is distinguished from the western part, because it is not so densely covered by trees, and large trees are almost absent. Here can be seen *Acacia longifolia var. sophorae,* which reaches only 3-4 feet in height, *Olearia axillaris* and *Calocephalus brownii,* which is also small.

Between the main dune and Cunninghame Arm lies a broad strip covered by shrubs, and with solitary trees of *Banksia integrifolia,* which in this area do not grow large (Fig. 5). Here *Leptospermum laevigatum* is also not very big. Near the Cunninghame Arm, the sand is covered by sedges, *Carex jackiana* and *Juncus maritimus,* and therefore the areas of bare sand appear less frequently. Here and there may be found *Clematis microphylla* with fruits, while in depressions and near the Cunninghame Arm may be seen Austral Glasswort (*Salicornia australis*) and Seablite (*Suaeda maritima*).

1 *Banksia integrifolia*; 2. *Acacia longifolia* var. *sophorae*; 3. *Calocephalus brownii*; 4. *Spinifex hirsutus*; 5. *Ammophila arenaria*.

Photo: Author

During the excursion were collected 45 species, which relate to 24 families and 40 genera. In the first place come Compositae—12 species (26.7%), then Gramineae—4 (8.9%) and Chenopodiaceae—3 species (6.7%).

Here we find typical psammophyte plants with long horizontal roots (e.g., *Spinifex hirsutus*), and also halophyte plants (e.g., *Suaeda maritima*) which latter are indicators of salted soils. Most of the plants belong to xerophytes and mesophytes.

It would be of value to make a complete list of all plants growing on the Ninety Mile Beach and to ascertain the regularity in their distribution.

In conclusion it is necessary to mention a positive factor—the wishes of the Soil Conservation Authority and Lakes Entrance Foreshore Committee of Management to reclaim these dunes by fencing them and planting *Ammophila arenaria*. These measures are indeed welcome and it may a worthwhile suggestion that they be extended to other parts of the Ninety Mile Beach.

Acknowledgements

The author is very grateful to Miss Jean Galbraith for assistance with identification of plants collected by him.

References

Audas, James Wales. *The Australian Bushland*. Melbourne, 1950.

Bird, E. C. F. A geomorphological study of the Gippsland Lakes. The Australian National University. Canberra, 1965.

Galbraith, Jean. *Wildflowers of Victoria*. Melbourne, 1952.

Hills, E. Sherbon. *The Physiography of Victoria*. Melbourne, 1960.

"Land Flora of Victoria." Extract from *Victorian Year Book*. No. 76. Melbourne, 1962.

Victorian Year Book. No. 77. Melbourne, 1963.

Willis, J. H. *A Handbook to Plants in Victoria*. Vol. I. Melbourne, 1962.

Below appears a list of plants collected by the author during the excursion on Long Island:

* Indicates introduced plants.

Botanical name	Common name	Abundance according to Drude's scale
Fam. Gramineae		
**Ammophila arenaria*	Marram Grass	Soc.
Pragmites communis	Common Reed	Sp.
Spinifex hirsutus	Hairy Spinifex	Soc.
**Sporobolus capensis*	Rat-tail Grass	Sol.
Fam. Cyperaceae		
Carex jackiana	Sedge	Sp.
Fam. Restionaceae		
Calorphus lateriflorus	Spreading Rope-rush	Sp.
Hypolaena fastigiata	Tassel Rope-rush	Sol.
Fam. Juncaceae		
Juncus maritimus	Sea Rush	Sol.
Fam. Liliaceae		
**Smilax australis*	Austral Sarsaparilla	Sp.
Fam. Santalaceae		
Exocarpus cupressiformis	Cherry Ballart	Sol.
Fam. Protaceae		
Banksia integrifolia	Coast Banksia	Soc.
Fam. Polygonaceae		
**Muehlenbeckia adpressa*	Climbing Lignum	Sol.
**Rumex crispus*	Curled Dock	Sol.
Fam. Chenopodiaceae		
Rhagodia baccata	Seaberry Saltbush	Sol.
Salicornia australis	Austral Glasswort	Sp.
Suaeda maritima	Seablite	Sp.
Fam. Aizoaceae (Ficoideae)		
Carpobrotus acquilaterale	Angular Noon-flower	Sol.
Fam. Ranunculaceae		
Clematis microphylla	Small-leaf Clematis	Col.
Fam. Winteraceae		
Drimys lanceolata	Mountain Pepper	Cop.
Fam. Rosaceae		
Acaena anserinifolia	Bidgee-widgee	Sp.
Fam. Leguminosaea		
Acacia longifolia var. *sophorae*	Coast Wattle	Soc.
**Dolicos lignosus*	Dolicos	Sol.
Fam. Geraniaceae		
Pelargonium australe	Austral Storks-bill	Sp.
**P. graveolens*	Scented Pelargonium	Sol.
Fam. Euphorbiaceae		
Euphorbia sp.	Spurge	Sol.
Fam. Rhamnaceae		
Pomaderis aspera	Hazel Pomaderis	Sol.
Fam. Myrtaceae		
Leptospermum laevigatum	Coast Tea-tree	Cop.
Fam. Epacridaceae		
Leucopogon parviflorus	Coast Beard-heath	Sp.
Fam. Primulaceae		
Samolus repens	Creeping Brookweed	Sol.
Fam. Apocynaceae		
Alyxia buxifolia	Sea-box	Sp.
Fam. Solanaceae		
**Lycium africum*	African Boxthorn	Sol.
Solanum aviculare	Kangaroo-apple	Sp.

Fam. Campanulaceae		
Lobelia anceps	Angled Lobelia	Sol.
Fam. Compositae		
Brachycome graminea	Grass Daisy	Sol.
Calocephalus brownii	Cushion Bush	Cop.
Cassinia aculeata	Common Cassinia or Dogwood	Sol.
Gnaphalium luteo-album	Jersey Cudweed	Sol.
Helichrysum gunnii	Coast Everlasting	Sp.
H. ferruginium	Tree Everlasting	Sol.
Hypochaeris radicata	Flatweed or Cat's-ear	Sol.
Olearia axillaris	Coast Daisy-bush	Sp.
**Senecio elegans*	Purple Groundsel	Sp.
S. lautus	Variable Groundsel	Sol.
S. linearifolia	Forest Groundsel	Sol.
S. spathulatus	Coast Groundsel	Sol.

Photoflora '68

Nature photographers are invited to participate in Photoflora '68, the fifth photographic competition and exhibition organized by the Native Plant Preservation Society of Victoria.

Entries of 35 mm. colour transparencies are invited in the following sections:

A. Victorian wildflowers, excluding orchids.
B. Victorian orchids.
C. "In the bush with a camera."
D. Australian wildflowers not normally found in Victoria.

Trophies will be awarded in each section.

Entries close on 5th February, 1968, and entry forms with full particulars are obtainable from the Competition Secretary, Miss B. C. Terrell, 24 Seymour Avenue, Armadale, 3143.

Public screenings of accepted slides will be held in March and April, 1968, at Albury, Bairnsdale, Bendigo, Boort, Geelong, Hamilton, Launceston, Mansfield, Melbourne, Mildura, Mornington, Morwell, Ringwood, Shepparton and Warrnambool.

Mammal Survey Group

Mammals of the Metropolitan Area

In addition to the surveys being undertaken further afield, the Mammal Survey Group is commencing a survey of the mammals of the Metropolitan area. This will be based largely on locality records for mammals in the Melbourne suburbs, with attention being directed initially at the two possums common in Melbourne, the ringtail *Pseudocheirus lanuginosus* and the brushtail *Trichosurus vulpecula.*

The group therefore requests all F.N.C.V. members to help. Reports of sighting of either of these possums (or any other non-domestic mammal) would be greatly appreciated in expanding our records. All data will be plotted on a map of the Melbourne area. Specific details of localities are needed, so that they can be pin-pointed in a street directory, with details of date, time of day and surroundings.

Information should be sent to the Hon. Secretary, Mammal Survey Group, 39 Huntingtower Road, Armadale 3143.

CONSERVATION

Because of the importance of this topic, it was felt that a summary of Mr. A. Dunbavin Butcher's address at the October meeting of the F.N.C.V. should appear in the main text of the magazine, rather than in the General Meeting Report.

Two quotations laid the foundation for this address on "The Philosophy of Conservation within the Department of Fisheries and Wildlife". The first was taken from an editorial headed "Conservation", in the "Chicago Tribune" this year.

". . . . Conservation's best chance depends on the defence of the natural environment, by people with nothing more to gain than helping the earth remain habitable. We all depend on the world, which man did not make, and had better not pollute much further than he already has."

The second quotation was taken from a publication from the White House in America, entitled "Restoring the Quality of our Environment". This was a report by a Science Advisory Committee to the President.

". . . . Environmental pollution is the unfavourable alteration of our surroundings, wholly or largely as a by-product of man's action."

The F. and W. Department today is moving more and more towards environmental work; because most of the things which have been done in the past, and which are still being done, will count very little indeed if something is not done about retaining the integrity of the environment.

This deserves the highest priority which any organization working in this field can give. It is appreciated that an organization such as the F.N.C.V. cannot move very far in this field on its own, but if the above things are borne in mind when dealing with any problems, a greater measure of success will be achieved than by worrying about minor matters.

If we do not succeed in the environmental field, the F.N.C.V. will not be worth retaining, nor will the F. and W. Department have any further function. It is as simple as this.

A third quotation added weight to this, and was taken from the same publication from the White House as was the second.

". . . . Carbon dioxide is being added to the atmosphere of the earth by the burning of coal, oil, and natural gas at the rate of six billion ton per year. By the year 2000, there will be about 25% more carbon dioxide in our atmosphere than at present. This will modify the heat-balance of the atmosphere to such an extent, that marked changes in the climate, not controllable, could occur."

This is what is meant by *environmental change*. Most of us spend far too much time in worrying about things which anybody can recognize, while the really important matters are those that are overlooked—recognition is the first step towards solving a problem.

The Department is involved with a number of other organizations, all vitally interested in conservation.

* * *

Land Utilization Advisory Council

This is the most important conservation activity in Australia today, but the majority of the population are unaware of its existence. This point is emphasized by the fact that last year, an allegation was made that a lyrebird had been shot in Sherbrooke Forest, which led to editorials, feature articles and letters, appearing in the

daily press. That same month, only one Melbourne newspaper reported a Government direction, greatly broadening the terms of reference of the Council.

This is where we go wrong—wasting our efforts, wasting our time, and wasting our money on the minor passing events, and not even recognizing the major ones.

The L.U.A.C. exists for each member to make a contribution towards the proper utilization of the resources of this State, and if the job of the Council is done properly in planning the utilization of the land as a whole, then wildlife will really benefit because it will have its proper place in the development of the State.

The members of the L.U.A.C. comprise the Chairman of the Soil Conservation Authority, the Chairman of the State Rivers and Water Supply Commission, the Chairman of the Forests Commission, the Secretary for Lands, the Director of Agriculture, the Secretary for Mines, and the Director of Fisheries and Wildlife.

Wildlife Reserves Investigation Committee

This committee consists of the Chairman of the S.C.A., the Chairman of the S.R.W.S.C., a Commissioner from the Forests Commission, a senior man from the Lands Department, and the Director of Fisheries and Wildlife.

The term of reference from the Government for this Committee is to advise the Government on what areas of land shall be set aside for Wildlife use; taking into account also, the needs of the community.

To date, every recommendation put before the Government by this Committee has been adopted.

Western Port Co-ordination Committee

This was set up by Cabinet to develop Westernport Bay on a rational basis.

The Pesticides Review Committee

The inquiry into pesticides eventually led to the formation of this Committee last year. Results are not expected to be dramatic; but gradually the misuse of pesticides will be checked.

The International Union for the Conservation of Nature and Natural Resources

Last year, the Director of Fisheries and Wildlife was appointed to the Committee of the Ecological Effects of Chemical Controls on the Ecology Commission, of the above International Union. His colleagues are a Russian, a Frenchman, a Dutchman, an Englishman, a Swiss, and an American.

The function of the Committee is to examine the pesticide situation throughout the world, and to report to the International Union for the Conservation of Nature.

The Town and Country Planning Board

This Board is conservation orientated, and is very much aware of this position.

In this field, the Fisheries and Wildlife Department is connected closely with the Phillip Island Planning Order and the Tower Hill Planning Order.

A select Committee of Parliament has been set up to examine the question of drainage works throughout the State. Already the Fisheries and Wildlife Department has given evidence on four occasions relating to the pollution of *aquatic environment.*

The Australian Conservation Foundation

This body has perhaps been criticised for its lack of action. But up until now, only background work has been done. However, quite soon, Dr. D. McMichael will take over the Directorship, and given time, the Foundation will become most active, and should flourish. The headquarters for the present, will be at Macquarie University in Sydney, and have already been made available at no cost to the Foundation. Later, it is hoped to move to the proposed National headquarters in Canberra.

The Foundation is a national body, not political or departmental, but members of the Executive act in their individual capacities on the Council itself.

* * *

A considerable amount of co-operation takes places between the Fisheries and Wildlife Department and other groups.

The Department is dependent to a large extent on the Victorian Ornithological Research Group for ornithological work. The Mammal Survey Group of the F.N.C.V. makes its contribution to the conservation story of this State. The Natural Resources Conservation League has Government Department representation in it, and provides valuable assistance towards conservation.

The Underwater Explorers and Photographers Club made possible the five year survey of Port Phillip Bay, because of the lack of manpower within the Department to do the job itself. This was one of the most detailed underwater surveys carried out anywhere, and will be most useful and important in relation to the Carrum Sewage Outfall question.

The Junior Chamber of Commerce held their State convention at Marysville in August last, and announced that "Conservation" was to be their theme for 1968. When the Federal body meets in Melbourne this month, the State body hopes to persuade it to adopt "Conservation" as the Australian program; and if this eventuates, conservation will receive a great boost.

The Australian Association of Advertising Agencies held a "Conservation" seminar this year, and are going to use their public-relation skills to this end, with the Yellingbo Reserve to be featured first.

The Bird Observers Club has given valuable and practical assistance for years, and has quite recently published an excellent brochure on Serendip.

And so these are some of the avenues through which conservation is being looked at and paid for, in a way we have not known before in the history of the State; and because of this the Department is most optimistic of the future of the State of Victoria from a conservation viewpoint.

* * *

Currently of course, the Fisheries and Wildlife Department controls the Snobs Creek Freshwater Fisheries Research Station and Hatchery in the north-east of Victoria. Near Lara, between Melbourne and Geelong, is the Serendip Wildlife Research Station. Nothing quite like it exists in the world; for it was purchased as a productive farm, and has continued as such, whilst permitting the practical demonstration that farming and wildlife conservation are indeed compatible. It is expected that in the future, farmlands will provide a great potential contribution to conservation within the State.

An appeal has also been launched to help finance research into *Environmental Contamination*. To emphasize this phrase, and to illustrate what effect it can have on wildlife, it has been found that no animal—whether mammal, fish or bird—which has been examined by the Department

to date, has been free of pesticidal residue. It appears from this, that all areas, whether remote or not, may be affected by atmospheric transmission of pesticides.

Finally, tenders have been let for the building at Heidelberg in Victoria, of the Arthur Rylah Fish and Wildlife Research Centre.

This Centre has been planned to fulfil the requirements predicted for at least the next ten years, but remains flexible enough to cover unforeseen or new problems.

The Marine and Freshwater Research Groups are to have access to one hundred fish tanks with individually controlled temperatures and ranging in capacity from 2 gallons to 1000 gallons. These will allow the study of fish and molluscs under varying degrees of salinity, temperature, turbidity and oxygen levels, thus permitting the definition of their response to various factors in the natural environment.

The Environmetal Studies Group will also be able to use the aquarium room for investigation into pollution.

Breeding studies and post mortem examinations will be carried on by the Wildlife Research Group in another section of the building.

The Natural History Survey Room will be virtually a reference museum of animal specimens, but in addition, will also have large wall maps and banks of filing cabinets to house the accumulating facts about the distribution and other information on native fauna. An annexe will house the reference library, and facilities for lectures, films, and meetings. The building is expected to be completed in the latter part of 1968.

This, of course, will be one of the most important phases in the development of the research section, and all connected with it are looking forward to the completion date.

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Notes on a Wintering Colony of Bats

By John H. Seebeck* and
E. Hamilton-Smith†

Introduction

On July 5th, 1966, at the request of the Melbourne and Metropolitan Board of Works, we visited a tunnel forming part of the Maroondah Aqueduct for the purpose of removing a colony of bats, which it was considered might be a source of pollution to water in the tunnel. This colony proved to consist of some 2,000 *Miniopterus schreibersii,* the common Bent-winged bat, and about 20 *Myotis adversus,* the Large-footed Myotis. The bats were collected by hand-netting and removed to the Old Swedish Mine at Panton Hills, already known to be a wintering colony of *M. schreibersii.* It was regrettable that a large number of animals died during the transfer, and it is felt that this incident along with other features of the colony are worthy of record and discussion. Access to the tunnel has since been blocked to prevent re-establishment of the colony.

Description of Tunnel

The tunnel concerned (No. 10), is situated near Healesville, Victoria, (Lat: 37° 40′S, Long: 145° 31′E). It was constructed in 1890, and is 1650 ft. in length, with a cross section of approximately 10 ft. in width and from 8-10 ft. in height. Apart from a short section at either end, the tunnel is unlined and has a ceiling of exposed broken rock with many crannies and small domes. A number of drill holes used during tunnel construction can also be seen. At the time of our visit there was little water passing through the tunnel, the maximum depth being about 10 inches.

All bats were roosting in ceiling recesses, so being protected from the draughts which blow through the tunnel. A few animals were hanging singly, but the majority were tightly clustered in groups ranging from 10 to 150 individuals. This contrasts with the winter roosting behaviour described by Dwyer (1964) for *M. schreibersii* in North-eastern N.S.W., where wintering groups clustered in exposed parts of the cave in such a way as to favour heat dissipation. However, the tunnel visited by us was cold and extremely draughty, and more exposed roosting would have led to excessive heat loss from the animals.

The tunnel is constructed through granites, and the roosting sites, both those in use and many others, showed extensive erosion. Drill holes selected as roosts were often enlarged from their original diameter of about one inch to as much as three inches. Dwyer (1965a) described the roof erosion caused by bats in Australian limestone caves, which is often accompanied by extensive staining of the rock. No such staining has occurred in this tunnel, and it appears that the rock has been softened by the chemical action of urine, then broken away by the claws of the animals.

Occurrence of *Myotis adversus* Horsfield

The presence of *M. adversus* in this colony was not discovered until after the animals had been removed from the tunnel, so no roosting details were

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† 17 Helwig Ave., Montmorency, Victoria.

specifically noted. However, it is of interest to record a further occurrence of this sparsely distributed bat, and to note that it is consistent with the observation of McKean and Hall (1965), that such colonies are in close proximity to water.

A number of further specimens or occurrences of this bat have also come to light since the paper by McKean and Hall (loc. cit.), and it has been suggested that we might also record these. In the course of further examination of museum collections, McKean (pers. comm.) has seen one specimen from Melville Island, N.T. (Reg. Nos. J 2756-7, Queensland Museum). Miss Barbara Dew has found a small group of *M. adversus* among a *Miniopteris schreibersii* colony in a water tunnel at the Warragamba Dam, N.S.W. Three specimens were taken from this group (CSIRO Divn. of Wildl. Res., Reg. Nos. MH912-4). Miss Dew's report is, of course, remarkably similar to the one contained in this paper. P. D. Dwyer reports a maternity colony at Lake Manchester, Southern Queensland, while he has also established that the colony previously reported at Samford in Queensland is also a maternity site.

One of us (E.H.-S.) located six specimens of *M. adversus* in the Anticline Cave, Murrindal, Vic., on 30th October, 1966. One of these was banded, and the following data are available: It was banded as a pregnant female at Cloggs Cave on 5/12/1961, and subsequently recovered on 10/4/1962 at Cloggs Cave.

On 11th November, 1966, K. G. Peisley (Fisheries and Wildlife Department) picked up a semi-mummified specimen of *M. adversus* on the Main Plateau on Seal Rocks, Westernport Bay, Vic.

Band Recoveries in
Miniopteris schreibersii (Kuhl)

Of the bats handled, 67 *M. schreibersii* have been previously banded by Hamilton-Smith. The sites and dates of banding are summarized in Table 1.

The table indicates that this colony has a close relationship to that in the Old Swedish Mine at Panton Hills, and the bats are likely to move irregularly between these two sites. One animal (20-07611) banded at Nowa Nowa on 29/2/1964, had also been previously retrapped at the Old Swedish Mine on 25/7/1965. Hamilton-Smith (1965) has defined four populations of *M. schreibersii* in Victoria, and from the banding data obtained in this instance, it is clear that this group belongs to that population which is based upon the Nargun's Cave maternity colony.

It is therefore of considerable interest to note the recovery of an in-

TABLE 1

BANDING DATA OF MARKED SPECIMENS RECOVERED FROM COLONY

Date of banding	Place of banding	Number of animals
15 Jan. 1964	Nargun's Cave, Nowa Nowa, Vic.	1
29 Feb. 1964	—do—	6
25 July 1965	Old Swedish Mine, Panton Hills, Vic.	58
18 Sept. 1965	Bat Cave, Naracoorte, S. Aust.	1
10 Oct. 1965	Old Swedish Mine, Panton Hills.	1

dividual from the Naracoorte population on this occasion. This is the first record of a bat from the Naracoorte population joining a colony within another population, although such interchange is not uncommon between other defined populations. Dwyer and Hamilton-Smith (1965) have drawn attention to the fact that the Naracoorte population has a different timing of the reproductive cycle and different pattern of movement to other populations in South-eastern Australia. Observations of interchanges to other populations are accordingly of particular interest.

Possible Causes of Mortality

As mentioned above, a distressingly high mortality occurred in handling these animals, 615 *M. schreibersii* and 13 *M. adversus* having died. It seems likely that this was due to the torpidity of the animals leading to their suffocation by being massed together in the holding cage. Torpidity in this species is related to low body temperature, and Morrison (1959) showed that Queensland specimens were unable to walk when their body temperature dropped below 26°C and unable to fly at body temperatures below 30°C. When torpid animals are collected for banding purposes, they normally re-warm quickly on being disturbed and climb up the sides of the holding cage. The fact that so many failed to do so on this occasion may have been related to the low ambient temperature which could have prevented them re-warming in the usual way.

Shimoizumi (1959) in studying the species *M. schreibersii* in Japan reports that under normal conditions, wintering animals awake every 4-5 days, and that each period of awakening lasts only 30-40 minutes. It is clear that more frequent awakening or longer periods of waking as may occur when bats are being handled, would make heavy inroads upon the animals' store of energy for survival over winter. A further possible explanation of the present mortality is therefore exhaustion of the animals by the prolonged handling involved.

Experienced banders in Australia have tended to restrict banding during winter, or to refrain from it completely, as observation showed that banding tended to accelerate the normal winter loss of weight. Dwyer (1965b) has shown that Australian banding mortality in this species is negligible, and this contrasts markedly with European experience where mortality has been high, but where most banding has been carried out at wintering sites. Beaucournu (1962), in reviewing the results, effects, and problems of bat-banding in France, suggests that banding during hibernation has been a major cause of mortality and should be avoided.

Present evidence therefore supports the current practice of minimizing handling of bats during winter torpidity. Although some observation of wintering colonies is essential in studies of population movements, actual disturbance of the animals can be kept to a minimum without adversely affecting the study programme.

Details of Specimens

The dead bats have been preserved in the collection of the Fisheries and Wildlife Department, Victoria, and provide a useful series for further study. Of the *M. schreibersii* specimens 603 are preserved in 70% alcohol, and study skins and skulls were prepared from 3 males and 3 females. Eight *M. adversus* are alcohol specimens and 1 male and 4 females are preserved as study skins and skulls. Some details of this sample are summarized in the tables following.

TABLE 2

SEX COMPOSITION OF SAMPLE COLLECTED

	Male	Female	Total
Myotis adversus	3	10	13
Miniopterus schreibersii	182	433	615

TABLE 3

AVERAGE WEIGHTS AND RANGE OF SAMPLE COLLECTED

	Sex	No.	Average (gm)	Range (gm)
Myotis adversus	♀	10	11.1	10.1-12.2
Myotis adversus	♂	3	10.9	10.3-12.0
Miniopteris schreibersii	♀	433	17.5	13.1-22.7
Miniopteris schreibersii	♂	182	17.8	14.0-22.7

Acknowledgements

The authors record their thanks to Mr. Roy Kermode, of the Melbourne and Metropolitan Board of Works, for the opportunity to study this colony and for his practical assistance. The help of Mr. J. L. McKean in providing unpublished data on the distribution of *M. adversus* is also acknowledged.

REFERENCES

Beaucournu, J. C. (1962)—Observations sur le baguage des chiropteres: resultants et dangers. *Mammalia,* **26**: 539-65.

Dwyer, P. D. (1964)—Seasonal changes in activity and weight of *Miniopterus schreibersii blepotis* (Chiroptera) in north-eastern New South Wales. *Aust. J. Zool.,* **12**: 52-69.

Dwyer, P. D. (1965a)—Bat erosion in Australian limestone caves. *Helictite,* **3**: 85-90.

Dwyer, P. D. (1965b)—Injuries due to bat banding, Third and Fourth annual reports on bat banding in Australia, Simpson and Hamilton-Smith (Eds.), *C.S.I.R.O. Aust. Div. Wild. Res./Tech. Pap.,* **9**: 19-24.

Dwyer, P. D., and Hamilton-Smith, E. (1965)—Breeding caves and maternity colonies of the Bent-winged bat in south-eastern Australia. *Helictite,* **4**: 3-21.

Hamilton-Smith, E. (1965)—Distribution of cave-dwelling bats in Victoria. *Vic. Nat.,* **82**: 132-7.

McKean, J. L., and Hall, L. S. (1965)—Distribution of the large-footed Myotis, *Myotis adversus,* in Australia. *Vic. Nat.,* **82**: 164-4.

Morrison, P. (1959)—Body temperatures in some Australian mammals—1. Chiroptera. *Biol. Bull.,* **116**: 484-97.

Shimoizumi, J. (1959)—Studies of the hibernation of bats (1). *Sci. Rep. T.K.D.,* ser. B, **9**: 1-36.

Field Naturalists Club of Victoria

It is with regret that we announce the resignation of our President, Mr. W. L. Williams. He has efficiently carried out the duties of this Office, although for some time he has been in ill-health. Finally however, he felt that he could not continue. All members, I am certain, will wish him recovery, and thank him for a job well done.

Mr. Eric Allen has accepted the position of President until the end of 1967.

Extraordinary Meeting

In order to discuss the application from the Traralgon F.N.C. for affiliation with the F.N.C.V., an extraordinary meeting will be held in the Herbarium at 7.55 p.m. on 11 December 1967.

General Meeting—9th October

Approximately 120 members were in attendance to hear Mr. A. Dunbavin Butcher deliver an address on the "Philosophy of Conservation within the Department of Fisheries and Wildlife".

Before the guest speaker was introduced by the President, Mr. W. L. Williams, an apology was received from Mr. A. J. H. Fairhall who through being unwell, was unable to attend. Also, it was most disturbing to hear the news of the illness of Miss Wigan, who in her 92nd year, has been a stalwart member of the F.N.C.V. All present wished her a complete recovery.

The minutes of the previous meeting were taken as read on a motion moved by Mr. Hanks.

Correspondence was received regarding the coming Photoflora Competition and the Council for Adult Education Spring School to be held at Mt. Beauty from 28 October to 6 November.

Also received was a notification of the Mallee Regional Council and N.R.C.L. Convention to be held at Swan Hill on 30 and 31 October.

The Yarra Valley Conservation League Newsletter contained an appeal for help in the vigil on anything thought to be detrimental to any portion of the Valley.

Visitors were welcomed by the President, and in particular Mr. Young who was visiting from England.

The President at this stage introduced Mr. Butcher, who began by mentioning the evolution which has taken place in the Fisheries and Wildlife Department over the years; and which has run parallel with changes overseas.

A summary of the address appears on p. 344 of this magazine.

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The President thanked Mr. Butcher for a most comprehensive and informative address, and was supported by applause from the most appreciative audience.

Mr. W. Genery spoke of his article on *Lepidurus*, and handed it on to the Secretary for publication in the *Vict. Nat.*

The new members listed on p. 355 were elected and welcomed.

EXHIBITS

Mr. Swaby—*Plagianthus pulchellus* (Common Hemp or Ribbon wood).

Mr. Haase—N.S.W. Waratah (*Telopea speciosa*).

Mrs. North—Opal White Cliffs, N.S.W.

Miss Forse—Skeleton of Qld Cane Toad (*Bufus marmus*).

Mr. Strong—Marine Tube Dwelling Polychaete Worm under Stereo Microscope.

Geology Report—4th October

29 members attended with Mr. Dodds in the chair. Reports were given on the Group's excursion to the Cape Schanck area, and also on the general excusion to Broken Hill. The subject for the evening was the "Geology of the Mornington Peninsula" given by Mr. T. Sault. The main points were as follows:

Although the area concerned is only 300 sq. miles in area, it has had an interesting geological history. The base strata consists of slates and shales of Ordovician and Silurian age as represented elsewhere in Victoria. These were folded in early Devonian times and can be seen in various quarries and road cuttings in the north and east of the Peninsula. Small flows of acid lava occurred in Devonian times in the Arthur's Seat area, which was followed by the intrusion of grano-diorite at Dromana, Mt. Martha and Mt. Eliza. The great peneplain which existed at the late Mesozoic has been cut into, material removed and redeposited, and together with marine transgressions have left none of the landscape existing at that time. Fluviatile deposits originating from this landscape are seen in the cliffs between Mt. Eliza and Mornington. These are known as the Pre-Older Basalt deposits. In the Eocene, the Older Basalt and Lignitic Phases occurred concurrently. The Older Basalt reaches its greatest thickness at Flinders, over 2000 ft, while the Lignite on or near the surface has decomposed to a dark lignitic clay. This clay is exposed near tide marks at Flinders and Mornington. Miocene marine deposits laid down in the Tertiary sea are of considerable thickness, and are seen in many places near existing sea level, particularly at Flinders and Mornington. Erosion material caused by the recession of the Tertiary sea at late Miocene to Early Pliocene times overlie the marine deposits. They are to be seen in the cliff faces at Mornington. They are called the Baxter Sandstones. Dune-limestone deposits of Pleistocene age are seen at the western end of the Peninsula. They cover all that portion on the downthrow side of Selwyn's Fault, which crosses the Peninsula between Dromana and Cape Schanck.

EXHIBITS

Mr. Bairstowe—Malachite and Azurite, King Solomons' Mines. Pegmatite, Africa. Corundum, Zoisite, Tanzania. Trona, Kenya.

Mr. Francis—Cinnabar, Puki-Puki, N.Z. Hematite, Serpentine. Selwynite, Heathcote.

Mr. Wigmore—Molybdenite, N.S.W. Skonkinite, Mt. Dromedary, N.S.W.

Mr. McInnes—Gahnite, Cerrusite, Coronadite, Kyanite, Epidote, Smithsonite, Rhodonite, Pyromorphite, Broken Hill.

Mr. McCay—Smoky Quartz Crystals, Tourmaline, Beenak. Tiger Eye, Carnarvon, W.A.

Miss Carstairs—Almandine Garnet, Broken Hill.

Mr. Love—Fossil sea urchin, San Remo. Stibnite, Costerfield. Kaolinite, Bulla. Amazonite, Virginia, U.S.A. Pisolitic Ironstone, Heathcote. Graptolites, Werribee Gorge. Gmellinite.

Microscopical Group—July and August

July—Sixteen members and two visitors attended; Mr. J. Dawes chaired the meeting. The subject for the evening was "The microscope and its function in Metallurgical Investigation" by Mr. L. Flewin. He introduced his subject by dealing briefly with several types of microscopes, then more specifically with that as used in the field of metallurgy; thence to the comparison of various light sources, and by diagrams projected on a screen explained the control of illumination to surfaces under investigation. He also illustrated at length the application of polarized light, describing the crossed nicol and its mounting. He then gave a short description of Bosch &

Lomb metallurgical microscope and the operation of its light source—the carbon arc and its automatic feed.

The preparation of specimens, grinding, polishing and etching, and the materials used were dealt with in systematic order. The crystalline structures of ferrous metals were illustrated, and it was described how changes by heat treatment can produce predetermined physical qualities in these materials. Further the type of structure as seen by means of microscope does indicate to the experienced investigator the treatment the material has had, revealing in many cases manufacturing defects (i.e. either with forging, rolling or work stresses and/or fatigue cracks developing in service). And from the information so obtained the metallurgist can advise on corrective measures in either of the various stages of production, changes in working conditions, maintenance requirements and periodical inspections.

A wide range of examples were illustrated by means of 35 mm slides and also on some interesting 3″ x 3″ slides depicting fatigue failures of various heavy machine components. Also a good example of investigation to determine one particular colour of paint that had been originally used on a surface subsequently painted over many times since. A chip of paint surface had been sectioned and microphotographed, thus illustrating a means by which an accurate analysis was made for a restoration of an antique.

Specimens were available for inspection by members and many questions expertly answered.

Mr. McInnes proposed a vote of thanks for a well-prepared informative and unusual subject for our group.

Exhibits

The following were viewed under the 8 microscopes on the exhibit table.

Mr. P. Genery—Rotifer Brachionous type with eggs—2 samples. He also commented on the fresh water jelly fish specimens found in Yarra River.

Mr. K. Trotter and Paul Harris—Several Specimens of Silico Flagallata. Mixture of Diatoms with explanatory comments.

Mr. W. Genery—Samples of Protozoa and Didinium.

Mr. Nance—Root section *Lagerstromeria* and stained Crystal Violet and Erythrosin.

August—This meeting, attended by 11 members and 2 visitors, took the form of a members night with open discussion. Matters pertaining to Nature Show, arrangement of group exhibits, and time tabling of services of members thereto were finalized.

A draft programme submitted by Mr. Trotter for the October meeting, which will be an open night for students of schools to take form of 5 lecturettes by members of group, was tabled and agreed upon, both in principle and detail.

Exhibits

6 microscopes were available and the following specimens viewed and discussed.

Mr. McInnes—Live cheese mites taken from matured cheese which had been wrapped in unwaxed cloth, viewed under F.N.C.V. microscope.

Mr. C. Nance—Transverse section of stem of *Cordyline terminalus,* showing secondary thickening in a Monocotyledon stem, section 40 μ, mag. 25×. Stained (a) Dalafield's Haematoxlin and Safranin, (b) Safranin and Acid Green.

Mr. W. Genery—Ephydra—Aquatic larvae similar to Rattail Maggot, showing 9 pair of legs with 10-12 claws and body covered with spines. It pupates at 3 months emerging as brownish coloured fly prevalent in salt water, and putrified shallow rainwater pools.

Mr. K. Trotter—Diatoms—Several slides under Beck Kassel research microscope. (a) From Dr. Wishart's collection of Diatoms, mounted 1932, rearranged with 6 others on slide from same collection. (b) Diatom—*Isthmia Nervosa.*

Mr. J. Strong—Section of butterfly wing *Danus Plexippus,* mounted with laquer (Guras N.T.L.).

Mr. Woollard—Demonstrated on 8″ dia pond life net with an outer protection ring to prevent tearing of fabric whilst fishing. The handle of 4 sections, ends screwed into each other, made for compactness and efficient manipulation. This is another of Mr. Woollard's inventive developments.

The meeting was advised that it was anticipated we would be the guests of C.S.I.R.O. Forest Products Division on 20th September. Confirmation of this would be available in a few days.

F.N.C.V. DIARY OF COMING EVENTS

GENERAL MEETINGS

Monday, 13 November—At National Herbarium, The Domain, South Yarra, commencing at 8 p.m.

1. Minutes, Reports, Announcements.
2. Correspondence.
3. Subject for the evening—"The role of fire in the ecology of the Eucalypt". By Mr. Hodgson.
4. Election of New Members.

(a) *Ordinary:*
Mr. Clifford D. Polson, 16 Wards Grove, E. Bentleigh.
Joint: Mr. D. J. and Miss Jill Luxford, 38 Jackson St., Niddrie 3042. (Interests—Fauna, Botany.)
Mr. and Mrs. I. J. Bennett, 22 Echuca Road, Greensborough 3088. (Interests—Marine Biology, Geology.)

(b) *Country:*
Dr. Stephen Murray-Smith, Ti Tree Lane, Mt. Eliza 3930.
Miss Elaine M. North, Point Pearce Aboriginal Reserve, Yorke Peninsula, Sth. Australia 5573. (Interest—Geology.)
Mr. Fred W. Aslin, 29 Elizabeth St., Mt. Gambier, Sth. Australia 5290.
Miss Estele M. Canning, C/- Mr. W. Canning, Springhurst, Victoria 3682.

5. General Business.
6. Nature Notes and Exhibits.

Monday, 11 December—Extraordinary Meeting at 7.55 p.m. Business—Application for Affiliation with F.N.C.V. by Traralgon F.N.C.
Subject for Evening—An Address by Mr. L. Edgar of the Natural Resources League.

GROUP MEETINGS

(8 p.m. at National Herbarium unless otherwise stated)

Wednesday, 15 November—Microscopical Group.

Friday, 24 November—Hawthorn Junior F.N.C. meeting in Hawthorn Town Hall at 8 p.m.

Friday, 1 December—Preston Junior F.N.C. meeting in the Rechabite Hall, 251 High Street, Preston (north from Bell Street), at 8 p.m.

Monday, 4 December—Entomology and Marine Biology Group. (This group meets in Mr. J. Strong's rooms at Parliament House at 8 p.m.—enter through private gate at south end of building.)

Wednesday, 6 December—Geology Group.

Thursday, 7 December—Mammal Survey Group. (This group meets in the Library of the Fisheries and Wildlife Dept., Flinders Street extn., at 7.45 p.m.)

Thursday, 14 December—Botany Group, Members' Night.

F.N.C.V. EXCURSIONS

Sunday, 19 November—Labertouche area. Leader: Mrs. L. Dowel. The coach will leave Batman Avenue at 9.30 a.m. Fare $1.80. Bookings with the Excursion Secretary. Bring two meals.

Sunday, 10 December—Flinders. The subject will be marine biology and the excursion will be led by Mr. R. L. Jentz, who spoke to the Club recently on Polychaete Worms. The coach will leave Batman Avenue at 9.30 a.m. sharp. Fare $1.50. Bring two meals.

26 December to 1 January—Portland. The coach will leave Melbourne on Boxing Day and remain with the party for day trips to be taken in conjunction with the Portland F.N.C. Accommodation has been booked at Portland Motel for the coach party on a D.B. and B. basis, and the cost, including coach, will be $52 per person. Bookings should be made with the Excursion Secretary, accompanied by a $10 deposit and the balance paid by the end of November.

Field Naturalists Club of Victoria

Established 1889

OBJECTS: To stimulate interest in natural history and to preserve and protect Australian fauna and flora.

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Fauna Survey: MRS. R. FRANKENBERG, 39 Huntingtower Road, Armadale 3143.

Entomology and Marine Biology: MR. J. W. H. STRONG, Legislative Council, Parliament House, Melbourne, 3002.

MEMBERSHIP

Membership of the F.N.C.V. is open to any person interested in natural history. The *Victorian Naturalist* is distributed free to all members, the club's reference and lending library is available, and other activities are indicated in reports set out in the several preceding pages of this magazine.

Rates for January-December 1967 are:

Ordinary Membership	$5.00
Country Membership (over 20 miles from G.P.O., Melbourne)	$4.00
Junior Membership (under 18 years)	$2.50
Subscription to the *Victorian Naturalist* (non-members)	$4.00

All subscriptions should be made payable to the Field Naturalists Club of Victoria and posted to Mr. R. L. Smith, 430 Little Collins Street, Melbourne, 3000.

Note: The currency of the present club year and Volume 84 of the *Victorian Naturalist* is from January to December, 1967.

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Front Cover:
Koala, at Phillip Island. Photograph by Graham Pizzey.

close to nature

By G. M. WARD

With the arrival of the summer months come, among many things, the familiar choruses of the cicadas; and the most common species about Melbourne gardens is the Green Monday (*Cyclochila australasiae* Don.).

Little need be said in these pages with regard to the cicada's life history, for this is fairly generally known; but perhaps it may be of interest to mention some observations which I made on these cicadas during the summers of 1961 to 1964 at Heidelberg.

Ventral view of male Green Monday Cicada showing beak typical of the true bugs; and also sound producing tympanic membranes on the abdomen.

Photo: Graham Pizzey

It must be remembered however, that these observations were made at only one area, and could not be made on *each* day for the whole of the summer in each year. Therefore they should not be accepted as criteria for any more serious work, but perhaps it would be interesting to hear of any similar observations.*

During the late spring and early summer of 1961, when the cicada choruses were particularly numerous, I wondered why they occurred only at certain times of the day. I had previously supposed that cicadas sang continuously through the heat of the day—but after making these observations, this was not quite the way it appeared.

I began by listing as many factors as I thought may have some effect on whether cicadas sang or not. These included the temperature, humidity, weather conditions, wind strength, light intensity, and barometric pressure.

* Details should be sent to the Editor.

Three of these factors appeared to have more significance than the others. These were temperature, humidity, and time.

The highest temperature at which I recorded any sound from the cicadas was 87°F, and the lowest 65°F. The corresponding relative humidity to these two temperatures was 43 and 84 per cent respectively. The maximum and minimum relative humidity at which singing took place was 85 and 42 per cent.

Fifty per cent of all singing took place between 7.30 p.m. and 8.15 p.m., while the remainder was between the hours of 8.30 a.m. and 4.00 p.m. with one exception. On this occasion, singing occurred at 3.00 a.m. when the temperature was 68°F.

It was noticeable from these observations that cooler weather inhibited singing, but rain did not necessarily; for on one occasion rain was falling during a thunder storm, and singing took place. The temperature on this occasion was 70°F.

Of course, nothing positive can be concluded from these observations, and indeed, these factors may have little effect; but it seemed that *high*, as well as low temperature had an inhibiting effect on singing, and that winds of greater than force 5 on the Beaufort scale, also had this effect. Rain, providing temperature remains high enough, and light-intensity, appear to have no effect.

The order of true bugs, to which the cicada belongs, has of course other members; and some of these may not be as well known. One of these is shown in the accompanying photograph. This is an immature specimen of the family of Leaf-hoppers or Jassidae, and is showing the developing wing buds. It is very likely of the genus *Eurymela*, which is particularly common on eucalypts, and are found feeding in groups on the young leafy growth of these trees. Those in the illustration were feeding on *Eucalyptus nicholli*.

Other families of the true bugs include the Froghoppers and Treehoppers, both of which will be dealt with in a future article.

This month then, we have not dealt with anything really specific regarding the cicada; but we have seen that observations, no matter how insignificant they may seem at the time, may be of some value in the long term appreciation of the natural sciences.

Immature leaf-hopper showing developing wing buds and characteristic brood head.

Photo: G. M. Ward

★

The Editor takes this opportunity to thank all those who contributed material over the past 12 months, and on behalf of Council, to extend to all members and their families, best wishes for a joyous Christmas, and a successful year ahead.

★

BIRDS OF PORTLAND (Victoria District)

(Published by Portland Field Naturalist Club, July 1966)

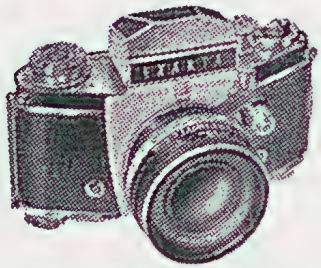
The Portland district of Victoria has been a popular locality for local and visiting bird lovers. It is therefore fitting, that such a list as that produced by Noel Learmonth should be available to those ornithologists who are to visit the area in the future.

For those who are to take part in the coming excursion to Portland in December and January, it should be as much part of their equipment as binoculars.

The booklet contains a list of 290 odd species which have been recorded for the district; and for each gives the frequency, the locality where it most commonly occurs, and in which cases nests have been found. For the rarer birds, the date of sighting and the recorder's name are listed.

Towards the end of the publication are a list of introduced species found and a provisional list of 10 species not yet authenticated.

Copies may be obtained from Mr. N. Learmonth, 33 Must St., Portland. Price—60c plus 5c postage.



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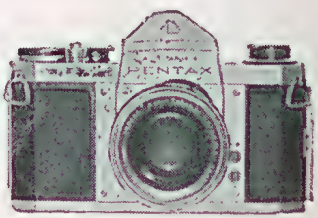

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Preliminary Report on McEachern's Cave, S.W. Victoria

By N. A. WAKEFIELD*

1. INTRODUCTION

The cave is 600 yards south-easterly from the Glenelg River, about 4 miles north of Nelson in the extreme south-west of Victoria. It was first entered on October 25, 1944, by the McEachern brothers, who had known of the entrance shaft when grazing sheep in the area in the 1930s.

On December 30, 1963, Mr. K. McEachern, after whom the cave is now named, took Mr. A. C. Beauglehole and others to explore it. Beauglehole made a small sample collection of mammal bones and sent them to me for comment. Noting that a skull of a certain desert species (*Bettongia lesueur*) was represented, I suggested that the cave should be investigated further as a probable site of fossils of prehistoric mammals.

Between January 26 and March 14, 1963, a team of local naturalists, directed by Messrs. Beauglehole and F. Davies, excavated and sieved many tons of the cave sediments and recovered a large quantity of bones.

Beauglehole then requested that the site be examined by persons experienced in palaeontology, so E. D. Gill of the National Museum and I met local naturalists at the cave on March 21, 1964. In the cave floor, about 18 feet north-west of the entrance, a test shaft was sunk to 4 feet depth, revealing an horizon of reddish sand and some lower sediments containing bones of extinct Pleistocene species of mammals.

On our advice, Beauglehole later organized the digging of two trenches, each several feet long, running north-west and north-east respectively from the test shaft. The latter trench revealed strata similar to those in Figure 5. Realizing the scientific value of the site, the local naturalists decided against further unsupervised excavation, and Stage 1 of the McEachern's Cave Project was thus concluded.

From September 1964 to mid-1965, Stage 2 of the project was carried out. Excavating was done only when I was present, and it was my task to do all the actual digging. The carrying of buckets of material, sieving, bagging and labelling specimens, and the removal of spoil, were done by various teams of helpers. A system of buckets, ropes and pulleys, power-operated by a Landrover, had been developed during Stage 1 for lifting spoil from the cave.

During Stage 2, five transverse sections were excavated, each 3 feet wide and extending from wall to wall of the cave. Sediments were removed either in units of 6 inches depth or according to strata. Record was kept of the source of all material, and bags of specimens were labelled accordingly. The five sections extended in aggregate from 15 to 30 feet north-west of the cave entrance, and the vertical faces at the ends of the excavation are referred to in this paper as the 15-foot profile and the 30-foot profile (see Figure 1).

Certain observations were made during Stage 2, but the several hundredweight of bone specimens that were obtained have yet to be sorted and analysed. When this is done the results should indicate the

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method by which further excavation is to be carried out. Then Stage 3 of the project can be commenced.

2. Morphology and Sedimentation

During the early part of Stage 2 of the excavation, Messrs. C. Ollier and A. G. Link, of the Melbourne University Geology Department, were invited to examine the morphology and sedimentology of the cave. As a result, the form of the cave was described in this journal (Ollier, 1964), and more recently Link (1967) discussed the sediments and other aspects of the site elsewhere. During the subsequent excavation, additional features became apparent and these have contributed to a somewhat modified and extended assessment, in the present paper, of late stages in the cave's morphology and sedimentation.

Figure 1 illustrates the general form of the cave and the extent of the excavation. The cavern lies N.W.-S.E., is approximately 180 feet long, averages about 10 feet in width and 10 feet in height, and it is connected to the surface by a vertical shaft 40 feet deep and 4 feet in diameter.

The formation in which the cave occurs is Gambier Limestone, which is of Oligocene-Miocene age. The thickness is estimated to have been approximately 1000 feet. The residual depth at Nelson is approximately 820 feet, and the present uppermost strata are of Lower Miocene age. The major characteristic of these upper strata is that they are composed mainly of skeletons of Bryozoa. (D. Taylor, pers. comm., 1967.)

The cave is located near the northern edge of an area of Pleistocene dunes of the Bridgewater Formation, and quartz sands of the Malanganee Formation form a surface veneer over the Tertiary limestone about the actual site. These formations are identified and described by Boutakoff (1963). The Bridgewater Formation consists mainly of calcareous sand, some consolidated, derived from reworked Tertiary limestone and comprising fragments of bryozoans, forams, etc., and in it reddish fossil soils form strata at various levels. The Malanganee Formation comprises fine quartz sand, some white and some iron-stained, derived during the

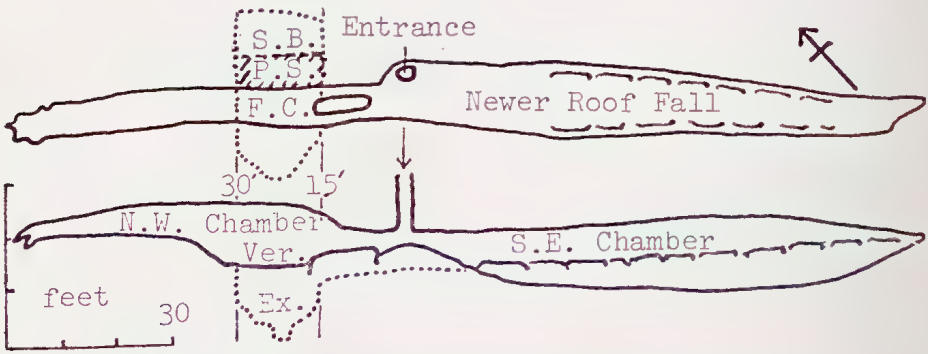


Figure 1. Plan (above) and Elevation (below) of McEachern's Cave.

S.B.—Stream Bed, P.S.—Pleistocene Sediments, F.C.—Floor Collapse area, Ver.—Roof of "Verandah" above P.S. and S.B., Ex.—Excavation. The arrow (top right) indicates North in the Plan.

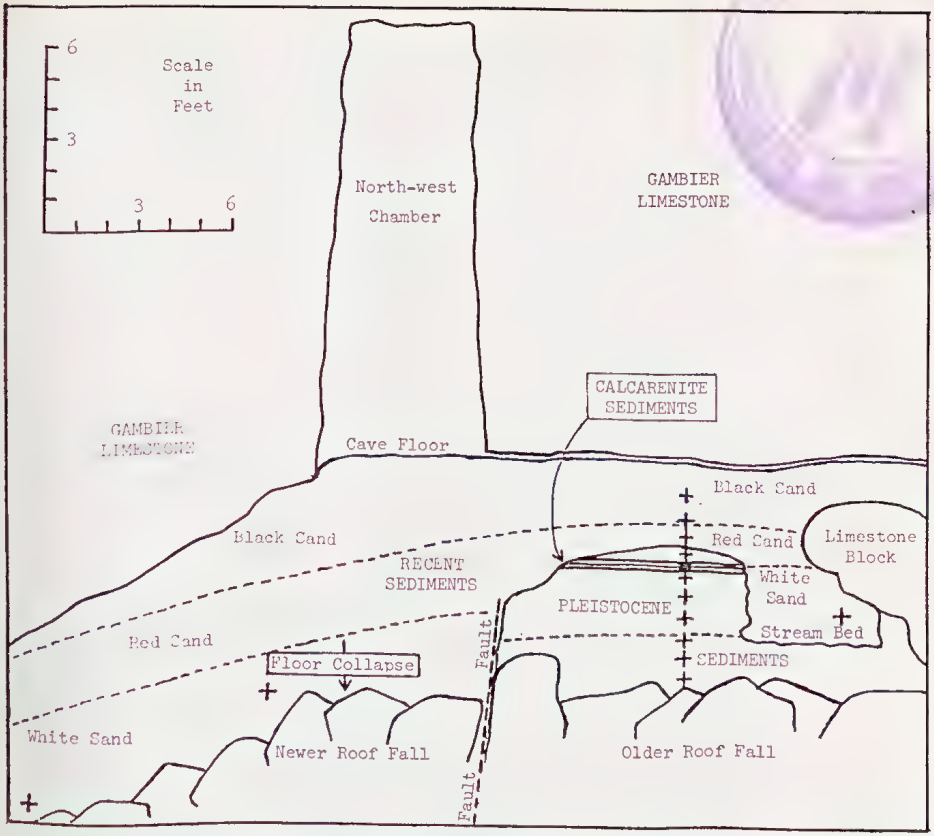


Figure 2. Cross-section of McEachern's Cave, 30 feet north-west of entrance shaft, showing sediments exposed on the north-western face of excavation.
The crosses indicate sources of samples analysed.

Pleistocene by wind winnowing from the calcareous dune ridges of the Bridgewater Formation.

By taking a number of aneroid readings at the Glenelg River, which is tidal in that area, and a number at the top of the entrance shaft, it was deduced that the cave floor was approximately 20 feet above present mean sea level.

Units of the cave fill are illustrated in Figures 2 and 3, which show profiles exposed during the excavation. Major features which were observed are:

(a) *Older Roof Fall.* Large, closely associated blocks of limestone, evidently originating from several feet above their present position. These floor the N.E. side of the excavation, except for an area very close to the wall, and presumably this floor extended across towards the S.W. side of the cave prior to the Floor Collapse (see below).

(b) *Pleistocene Sediments.* These lay on the Older Roof Fall limestone, to a depth of about 30 inches, and their main component was fine quartz sand. Immediately above the limestone blocks the sediments were grey in colour, very strongly compacted, and stratified according to the contour of the blocks. Against and under the N.E. wall, the lowest observed sedi-

ments were of various kinds and some appeared to have been deposited by early stream action. The highest Pleistocene Sediments were mostly unstratified, of medium compaction, brown in colour, and they appear to have been laid down comparatively quickly. The Pleistocene Sediments presumably extended across the cave, from wall to wall, prior to the Floor Collapse. The surface of these sediments sloped down at about 4° to the horizontal, from S.E. to N.W., and the lateral slope towards the N.E. wall varied from about 10° declination in the 15-foot profile to about zero in the 30-foot profile. These slopes indicate that, in the excavated area, the uppermost Pleistocene Sediments moved to their final location from the direction of the entrance shaft.

(c) *Calcarenite Sediments.* The uppermost Pleistocene Sediments were overlain by a deposit, about 1 to 2 inches thick, of very fine calcareous silty sand. This deposit comprised a series of variously coloured strata of thicknesses from less than 1 mm. to over 1 cm. They are identified as of aeolian origin. Some of these strata were cemented. (See Sections 3 and 4, and Figure 5.)

(d) *Stream Bed.* Against and under the N.E. wall there has been an open stream which, subsequent to the deposition of the Calcarenite Sediments, cut a bed down into the Pleistocene Sediments. The flow was from N.W. to S.E., the declination in that direction averaging 6° in the excavated area. The bed of the stream carried a rubble of bones and cemented calcarenite.

(e) *Newer Roof Fall.* From about the middle of the cave to the S.E. end, the floor consists of large limestone blocks derived from a comparative recent roof fall which evacuated the topmost part of the present chamber. A block belonging to this fall is exposed in the N.W. chamber near the entrance shaft. Presumably this phase of roof fall also formed the high arch above the excavated area, and the blocks from that arch comprise the floor of the central and S.W. side of the excavation. This floor declines sharply towards the N.W. end of the cave and towards (and under) the overhanging S.W. wall. This suggests that the lower cavern into which the Floor Collapse material moved was some distance to the west of the excavated area. The absence of both Pleistocene Sediments and Calcarenite Sediments above the limestone blocks that floor the centre and S.W. side of the excavation establish that they do, in fact, belong to a subsequent roof fall.

(f) *Floor Collapse.* There has been a collapse embracing the middle and S.W. side of the excavated area, which carried this part of the cave fill of limestone blocks and sediments down and laterally. A fault line lies immediately beneath the N.E. wall of the upper arch (Figures 2 and 3). This Floor Collapse may have been initiated by the weight of Newer Roof Fall material; and the cavity into which the slumping cave-fill moved was probably due to removal of underlying limestone by water action.

(g) *Recent Sediments.* Subsequently sediments filled the Floor Collapse cavity and Stream Bed, then continued to accumulate until the modern floor was established at about the earlier roof level, so that the recently voided upper arch became the present cavern. The major fraction of these Recent Sediments was fine quartz sand, and three gross strata are distinguished:

(i) White Sand. The Stream Bed and the sloping lower portion of the Floor Collapse cavity were filled mainly by loose whitish quartz sand

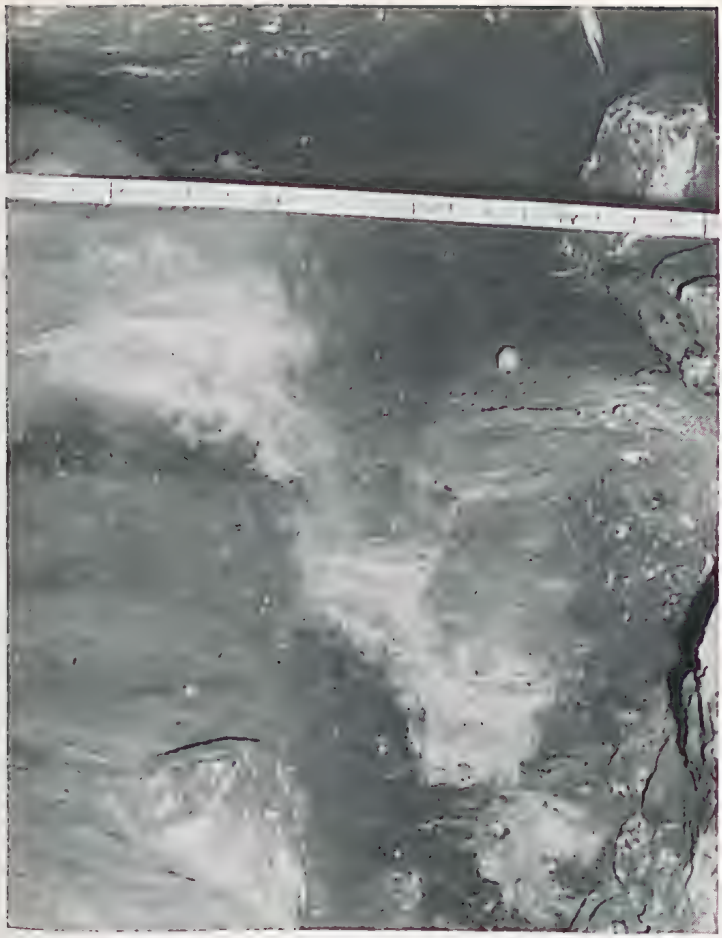


Figure 3. Part of cross-section of McEachern's Cave, 15 feet north-west of entrance shaft, showing sediments exposed on the south-eastern face of the excavation.

The scale is in feet. The Fault Line is beneath the 4 ft. mark. Relative positions of features are indicated to the right of the photograph.

with very little admixture of other material. Amongst it however were occasional intrusions of darker sand derived from eroded Pleistocene Sediments. The great bulk of the White Sand and the paucity of mammal bones in it suggests that it was deposited at a comparatively fast rate. At the lowest level excavated there were numerous concretions of sand cemented together by calcium carbonate. These were irregular in shape and up to about 10 grams in weight. The acid-soluble fraction was about 40 per cent, leaving about 60 per cent quartz sand. These aggregates were probably due to seepage of saturated solution. There should be evidence of a water table close below the bottom of the present excavation, but there was no sign of stratification in conjunction with the calcareous concretions.

(ii) Reddish Sand. Above the White Sand layer there was a stratum

of reddish quartz sand, generally about 1 to 2 feet thick and with a minor degree of cohesion. On the N.E. side of the excavation this was located immediately above the infilled Stream Bed and the Calcarenite Sediments, and thence it dipped to the S.W. At about the 15-foot cross-section, parts of the Calcarenite Sediments were separated from each other by a wedge of Reddish Sand (see Figure 3), demonstrating some entry of this sand, from the direction of the cave entrance, during the period of accumulation of the Calcarenite Sediments.

(iii) Black Sand. The uppermost sediments were blackish, due to an organic fraction, and they had a medium degree of cohesion. This layer was generally about level, but it dipped beneath the sloping S.W. wall.

In places the Recent Sediments were sharply divided into differently coloured layers, but elsewhere layers were intermixed or graded one into another. Some of the sand of the Recent Sediments evidently came in through the present entrance shaft, but it is probable that some spilled down through one or more fissures or small solution pipes situated towards the N.W. end of the cave. One such spill is accumulating a tall cone of sand in that chamber at present.

The Recent Sediments showed evidence of a minor amount of compacting, in that they had withdrawn a few inches from ceilings and overhanging walls with which they had been in contact. However, in the area of the cave which has been excavated, it is apparent that no roof falls or major subterranean subsidence took place during the deposition of the Upper Sediments. Close to the N.E. wall there had been a minor amount of water erosion of Reddish Sand, the cavities concerned having been infilled later by Black Sand.

Other Features of the Sediments.

Living tree roots were present in the Recent Sediments in the N.W. end of the cave. Tubular voids, of diameters up to 2 inches, occurred in the Pleistocene Sediments where root systems had decomposed, and numerous small tubes with minute lateral offshoots showed where terminal rootlets had penetrated the Calcarenite Sediments also.

Distributed through the Pleistocene Sediments and the Recent Sediments were many small pieces of the cave limestone, of sizes up to a few inches in length. A major stratum of charcoal occurred in the Reddish Sand, and traces of it occurred also through most of the cave sediments.

Gravitational movement, perhaps assisted at times by the activity of trapped animals, and water action, were responsible for a considerable amount of mixing of older cave sediments with material that entered more recently from the surface. Higher levels of cave fill material, such as cones of inspilt surface sand, are indicated by the scratch marks of wombats on vertical and overhanging walls several feet above the modern cave floor. These are much in evidence in the vicinity of the present entrance shaft.

3. Analysis of Sediments

Samples of the cave fill were taken from the 30-foot profile as follows:

(a) Pleistocene Sediments, adjacent to the Calcarenite Sediments and thence at 5-inch intervals below them.

(b) Several strata of the Calcarenite Sediments.

(c) Recent Sediments, at 1 inch intervals above the Calcarenite Sediments, and from various places in the White, Reddish and Black Sands.

TABLE 1

Acid Soluble Fraction and Quartz Sand Fraction of Sediments

		Vertical Distance from Orange-red Band	Percentage Soluble in Hydrochloric Acid	Percentage of Quartz Sand
Recent Sediments	Black Sand	+20 in.	7·3	85·
		+10 in.	4·8	87·
	Reddish Sand	+5 in.	4·2	93·
		+1–2 in.*	29·	62·
Calcarenite Sediments	Grey Layer	+0–½ in.	84·	3·0
	Orange-red Layer	—	94·	1·8
	Laminated Layer	−0–½ in.	96·	1·5
Pleistocene Sediments	Brown Sand	−1–2 in.	18·	73·
		−6 in.	18·	74·
		−12 in.	18·	76·
	Grey Sand	−18 in.	9·6	87·
		−24 in.	11·	85·
		−30 in.	11·	86·
White Sand	From Stream Bed		0·8	98·
	From Floor Collapse Cavity		0·7	98·
Limestone	From Roof and Wall		99·	0·4

* Reddish Sand diluted by Grey Calcarenite in ratio about 2 : 1.

Samples were taken also of the Tertiary limestone and of concretions in various places in the cave.

The samples were examined for fossils.

Percentage solubility in HCl was determined.

The quartz sand fractions of samples were separated out and analysed for grain-size distribution. (Sieve sizes used were of apertures from 0·124 to 0·026 inches.)

Heavy minerals were separated from quartz sand with bromoform and arrangement made for their identification.

Samples of the Calcarenite Sediments were separated into clay, silt and sand fractions, and X-ray diffraction examination of some of them was arranged.

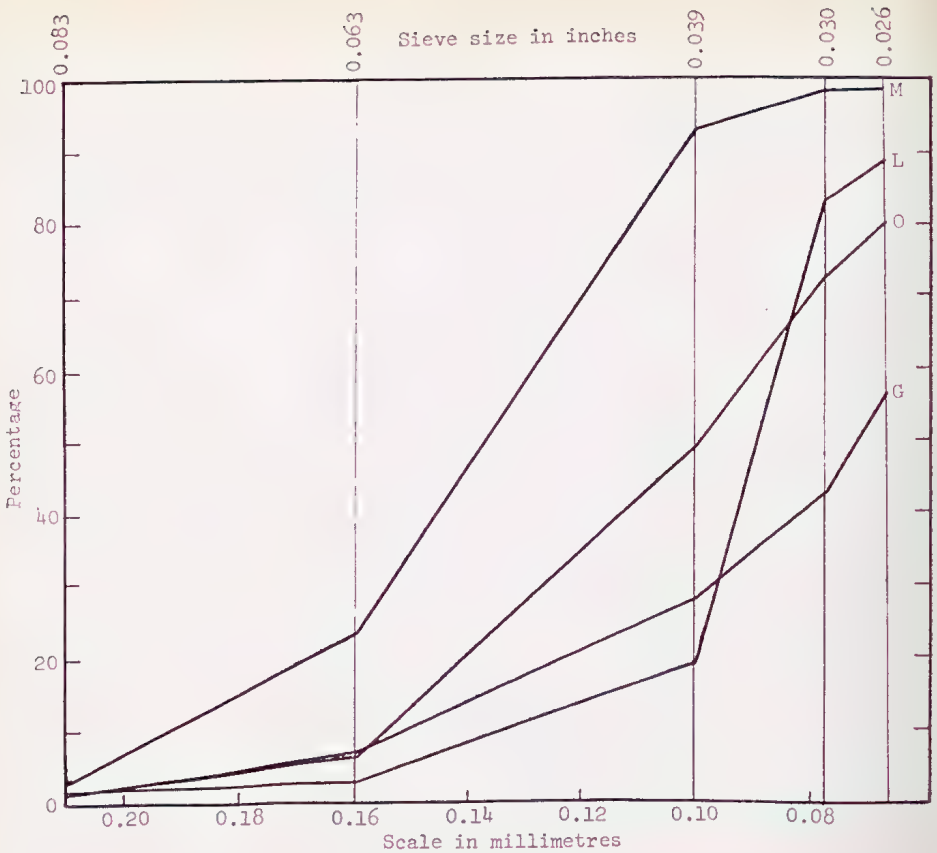
Results:

Table 1 sets out data of acid solubility and percentage of quartz sand.

Figure 4 shows the result of particle-size analysis of the quartz sand fraction of certain samples.

Limestone from the roof and wall of the cave was 98·5 to 99·5 per cent soluble in HCl* and yielded 0·2 to 0·4 per cent fine quartz sand. Besides the characteristic bryozoan fossils, forams (predominantly benthic) were well represented. The quartz sand was well sorted, with 70 per cent in the 78-100μ size range. These grains were, on the average, more angular than quartz grains of similar size in any

* None of the several samples tested gave results outside this range. However, Link (1967) gave 86.2 per cent for the acid solubility of this limestone, which suggests contamination of the sample with a quantity of acid-insoluble material (? quartz sand of surface origin).



Above: Cumulative particle-size graph, showing percentages of quartz sand remaining above the respective sieves.

Below: Particle-size histograms, showing percentages of quartz sand in the categories - A (>0.124 in.), B (0.124-0.083 in.), C (0.083-0.063 in.), D (0.063-0.026 in.), E (<0.026 in.).

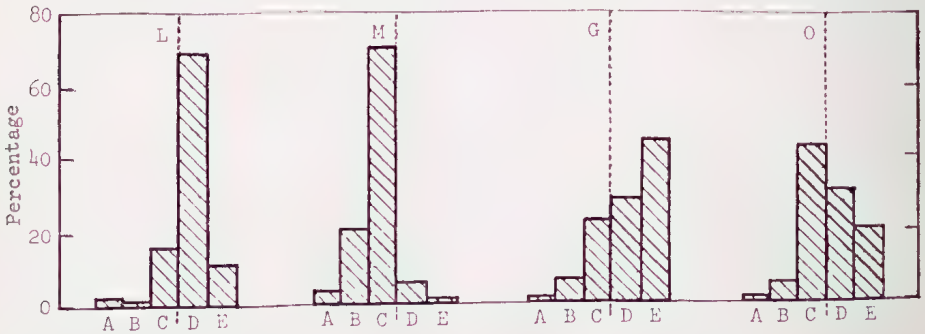


Figure 4. Particle-size analysis of quartz sand samples from McEachern's Cave, as follows, M—mean for samples from Pleistocene Sediments and Recent Sediments, L—from wall and roof limestone, O—from Orange-red Calcarenite, G—from Grey Calcarenite.

category of the cave sediments. The acid insoluble residue contained a conspicuous fraction of glauconite in the form of internal casts of forams and of comparatively large pieces of bryozoan skeletons. These large bryozoan casts provided a useful tracer to indicate the degree, if any, to which the mother limestone had contributed directly to the various cave sediments.

The Pleistocene Sediments and the Recent Sediments were similar. They contained over 70 per cent quartz sand, over 90 per cent of which exceeded 100μ in grain-size and, for the 12 samples analysed, there was no significant variation in grain-size distribution. In these samples the average grain-shape was subangular; grains were polished or frosted in about equal proportion, and many were iron-stained. These sediments are evidently derived mainly from the surface quartz sands of the Malanganee Formation in the immediate vicinity of the cave.

In the Pleistocene Sediments and the Recent Sediments much of the acid-soluble fraction was of Tertiary limestone fragments which had fallen from the cave walls and roof. Pieces of unabraded bryozoan skeleton, usually 1 to 2 mm long, were plentiful amongst these fragments. This material was more abundant in the Pleistocene Sediments than in the Recent. Moreover, both in the Pleistocene and the Recent Sediments, the higher strata contained more of these large carbonate fragments than the lower strata. (See Table 1.)

Both the Black Sand of the Recent Sediments and the Brown Sand of the Pleistocene Sediments contained appreciable amounts of vegetable matter. This was evidenced by dark-coloured colloidal suspensions when samples were placed in aqueous solutions, but it was not assessed quantitatively.

Heavy Minerals

The samples analysed were as follows:

1. From limestone of cave wall, 343 particles obtained from 136 mg. of quartz sand.
2. From Pleistocene Sediments, 18 in. below Orange-red Layer, 936 particles from 325 mg. of quartz sand.
3. From cemented Orange-red Layer of Calcarenite, 774 particles from 437 mg. of quartz sand.
4. From uncemented Orange-red Layer, 49 particles from 46 mg. of quartz sand.
5. From Grey Layer of Calcarenite, 49 particles from 46 mg. of quartz sand.

Before these were submitted for analysis, almost all the hematite in samples 3 and 4 was removed by manual treatment.

Table 2 sets out the result of the analysis which was obtained, and the accompanying report contained these details also:

(a) Samples 2 and 3 contained several strongly magnetic grains, i.e. magnetite, while the remaining samples were non-magnetic.

(b) The size of the grains was measured by using zircon as a standard. For the average-sized grains, length and width varied from 0·112 by 0·088 mm. respectively for slides 2, 3 and 5, to 0·076 by 0·060 mm. for slides 1 and 4.

In each case the heavy mineral sample was obtained from the whole of the quartz sand, not from a particular particle-size category.

There is a close similarity between samples 3 and 4.

The samples analysed suggest that heavy minerals are more abundant in quartz sand from the Gambier limestone and from the Malanganee Formation than that from the Calcarenite

Sediments, that garnet and perhaps anatase and pyrite are proportionately more abundant in the limestone than in the various cave sediments, and that hematite is proportionately less abundant in the Pleistocene Sediments than in the limestone or the Grey Layer of the Calcarenite. However, analysis of a series of larger samples from a wider range of sources is needed before significant comparisons of the heavy mineral assemblages can be made.

Link (1967) analyzed heavy minerals from the 63 to 125 micron particle-size fractions of surface sand, Pleistocene sediment, Recent sediment and the "Calcrete Layer". Hematite was not included in the analysis, and no significant differences were found between the assemblages. It is noted that pyrite was not found and garnet and anatase were found only in trace quantities in Link's samples.

4. Calcarenite Sediments

The Calcarenite Sediments (Figure 5) were of fairly uniform thickness

Table 2

Percentages by count of species in heavy mineral assemblages of sands from McEachern's Cave

	1. from limestone	2. from Pleistocene sediment	3. from cemented Orange-red Layer	4. from uncemented Orange-red Layer	5. from Grey Layer of Calcarenite
Anatase	1	tr	—	—	—
Andalusite	1	1	2	—	2
Aragonite	—	tr	—	—	—
Carbonates	—	—	1	—	—
Chalcedony	—	tr	tr	—	—
Composite grains	1	tr	—	—	—
Epidote	1	2	3	3	—
Fluorite	1	—	—	—	—
Garnet	3	1	tr	—	—
Glaucophane	tr	—	tr	—	—
Gold	—	tr	—	—	—
Hematite	14	3	12	12	14
Horneblende	1	3	2	1	2
Hypersthene	—	tr	tr	—	—
Kyanite	—	tr	—	—	—
Lepidomelane	tr	tr	tr	—	—
Leucoxene	14	8	13	12	4
Limonite	8	2	5	5	6
Monazite	1	1	1	2	2
Opaques, black	33	44	28	47	29
Pyrite	1	—	—	—	—
Rutile	5	9	22	9	4
Staurolite	—	tr	—	—	—
Topaz	1	1	1	—	2
Tourmaline	3	5	2	2	8
White Mica	—	—	tr	—	—
Zircon	10	18	6	7	27
Zoisite	1	—	1	—	—

Percentages are shown to nearest digit; trace (tr) is less than 0·5 per cent.
Most of the hematite was removed from samples 3 and 4 before analysis.
Black opaque minerals consist largely of ilmenite, with some magnetite and rutile and possibly a few black spinels.

(about 4 cm.) and exhibited the same general stratification throughout the area over which they were examined (approximately 15 feet by 4 to 5 feet). They overlaid the Pleistocene Sediments and were contoured accordingly.

There were occurrences of irregular strata here and there, between and within other strata, of quartz sand from the surface. Also, the network of fine tubular cavities, due to tree rootlets, had allowed quartz sand from the overlying Recent Sediments to filter down into the Calcarenite Sediments. In obtaining material for analysis from samples of these sediments, care was taken to avoid as far as possible the inclusion of such sand. This was not wholly successful however, as some of the strata were less than 1 mm. thick.

A number of excavations in the S.E. chamber of the cave did not discover any Calcarenite Sediments in that direction, and present indications are that they were deposited only in the N.W. chamber. The aerial transport of this aeolian material almost horizontally for distances up to 30 feet (from the lower end of the entrance shaft to points at the far end of the excavation) would have required strong air currents in that direction. This in turn would have required a considerable extension of the cave to the north-west, possibly with another connection to the surface. The cave does not now have any apparent air movement in its chambers.

The Calcarenite Sediments comprise three main bands, as follows:

Laminated Layer

A lower deposit, about 1 cm. thick, comprising grey, yellowish and white laminae, from 0·2 to 4 mm. thick. These were not studied except to note that the conspicuous white stratum comprised about 100 per cent of silt-sized particles of calcium carbonate.

Orange-red Layer

A medial band, usually about 10 to 15 mm. thick, of calcareous sediment (about 95 per cent acid-soluble). Some parts of it were wholly of about silt-sized particles, while other parts consisted mainly of comparatively coarse particles of fine-sand-size.

Many of the coarser particles were recognizable as forams and bryozoan fragments, and small particles of glauconite were present. These calcite and glauconite particles were much abraded, which, together with their small size, distinguished them from fragments derived directly from the cave roof or walls.

Hematite was abundant throughout this band, mainly in the form of silt and sand-size aggregates which did not disaggregate with prolonged violent stirring in sodium acetate solution. Due to the hematite, this band was uniformly orange-red in colour. Except as a dilution in the few millimetres both above and below this band, hematite was not noted except in traces elsewhere in the cave sediments.

About half the Orange-red Band was found to be cemented into very hard limestone. This cement did not occur at all in some areas, in other areas it incorporated the upper portion only of the band; and in a few places it included the whole of the band, sometimes with also a little of the Laminated Band beneath. The planar upper surface of the cement and the varying depth to which it extended, suggest that its formation was due to penetration of moisture from above. This would have required a period of high atmospheric humidity within the cave. There was no evidence of water-flow over these strata nor of any water

table having occurred anywhere in that area of the cave. It is suggested that, at the time concerned, there was an exposed water surface somewhere in the cave, probably to the north-west of the present chamber.

The cement, together with associated unconsolidated strata, comprised the "Layer C" (also called the "Calcrete Layer") of Link (1967), who reported it to be 81·3 per cent acid soluble and to contain "about 15 per cent" of "fine sand-size quartz grains". These figures indicate that the sample concerned comprised a mixture of Calcarenite Sediment and surface sand. (c.f. Table 1.)

The small quartz sand fraction (0·5 to 3·2 per cent for different samples) did not differ as regards character of the grains from samples of similar grain-size obtained elsewhere in the sediments of the cave.

An X-ray diffraction pattern indicated the presence of montmorillinite in the Orange-red Layer.

Grey Layer

An upper band, usually about 15 to 20 mm. thick, of unlaminated calcareous sediment, up to 90 per cent acid-soluble, with sand : silt : clay ratio (whole sample) in the order of 65:28:7. More than half the insoluble fraction was of silt-size particles. The clay was illitic.

Proportionately, particle-size was smaller in the Grey Band than in the Orange-red Band, but otherwise the characters of both the calcite particles and the quartz sand were similar in the two bands.

The outstanding feature of the Grey Band was an abundance of valves of a freshwater ostracod (*Gomphocythere* sp.). This was not observed in any other of the cave sediments.

At the base of the Grey Band there was a lamina about 1 mm. thick of stiff plastic illitic clay, apparently formed *in situ*. Upwards, through approximately 2 inches, the Grey Band was progressively diluted by, and finally replaced by, Reddish Sand of the Recent Sediments.

Origin of the Calcarenite Sediments

The features of these sediments indicate that they were derived, during one or more periods of major wind erosion, from unconsolidated calcareous dunes of the Bridgewater Formation.*

In these dunes, calcium carbonate content varies from 90 to 100 per cent, and unconsolidated sands are very susceptible to wind erosion. The size mode of the calcite particles is about 30μ. The acid-insoluble fraction is quartz sand mainly in the 30 to 60μ size range, and Recent calcareous dunes are deficient in heavy minerals. These details are abstracted from Boutakoff (1963) and supplement data given in Section 2.

Freshwater swamps occur within a few miles to the south and west of the cave, providing possible sources of *Gomphocythere*.

The provenance of the various strata and bands of the Calcarenite Sediments indicates wind erosion of different components of the Bridgewater Formation. Calcite particles of fine-sand-size and silt-size, derived from re-worked Tertiary limestone, are common to all strata of the Calcarenite Sediments. The laminated lower band, the hematitic medial band, and the illitic upper band (with *Gomphocythere*), indicate erosion in

* Link (1967) emphasized an hypothesis that his "Layer C" (i.e. the lower and medial bands of the Calcarenite Sediments) could have originated as "fine-grained frost breccia", wedged off by seepage and freezing "when the atmospheric temperature near the top of the solution pipe entrance dropped below freezing point". However, the absence from the Calcarenite Sediments of coarse-sand-size fragments of bryozoan skeletons and of large glauconitic casts, deny that these sediments were contributed to appreciably by limestone from the cave walls or roof.

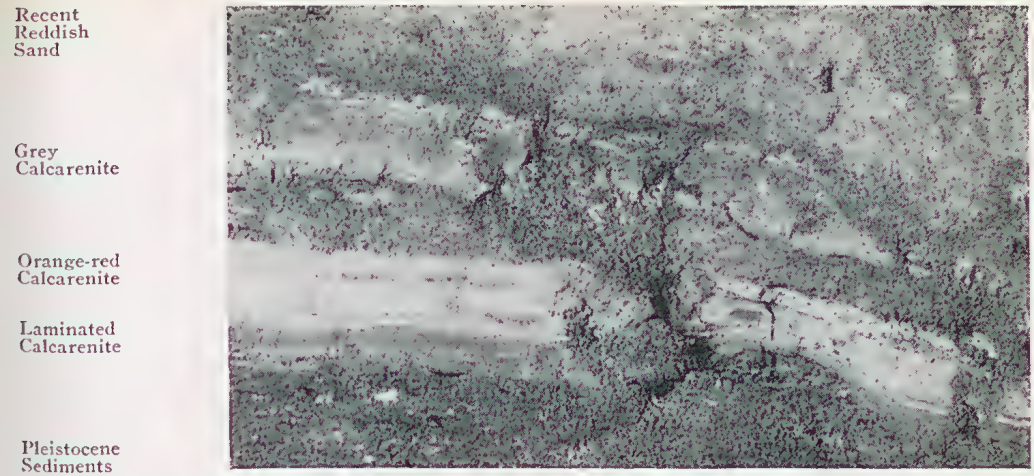


Figure 5. Profile of Calcarenite Sediments of cross-section of McEachern's Cave, 27 feet from entrance shaft. Natural size.
Sediments are identified to the left of the photograph.

turn of different strata and areas of the Bridgewater Formation, probably with a sequence of different prevailing wind directions.

5. Mammal Remains

Due to the funnel-like shape of the ground surface and the entrance shaft, McEachern's Cave has been a death-trap for terrestrial animals. There is no evidence that it was ever used as a roosting place by owls or bats.

During Stage 1 of the project, Beauglehole sorted the cranial material of mammals into four categories, which he named, according to their origin in the excavation, as follows:

(a) "Black Layer". From 0 to 14 inches below cave floor. This comprised Black Sand of the Recent Sediments.

(b) "Mixed Layer". Mainly from depths of 14 to 30 inches. This comprised mixtures of Black Sand and Reddish Sand of the Recent Sediments.

(c) "Red Layer". From depths of about 30 to 60 inches. As well as Reddish Sand, some of the White Sand stratum would be included here.

(d) "*Sthenurus* Layer". This referred to Pleistocene Sediments.

Table 3 shows an analysis of the mammal material in these categories. The figures are essentially Beauglehole's, as only minor adjustments were made to them when the material was re-examined. To make relevant comparisons between the faunas represented by each of the columns, the figures of the third column should be halved and those of the fourth column divided by 4. This is necessary because, while the first and second columns are similar in total number of individuals, the third and fourth columns total about twice and four times as many respectively. (That is not evidence of enrichment of the modern fauna; it simply indicates that more of the modern sediments were excavated and sieved during Stage 1 of the project.)

The fauna represented in the Black Sand layer is essentially the modern fauna of the Lower Glenelg River

TABLE 3

Analysis of mammal remains identified during Stage 1 of the McEachern's Cave Project, showing minimum numbers of individuals in each stratum.

Family and Species	Minimum Numbers of Individuals			
	Pleistocene Layer	Recent Layers		
		Red Sand	Mixed Sand	Black Sand
Dasyuridae				
Antechinus stuartii	29	—	20	31
Antechinus swainsonii	4	1	38	82
Phascogale tapoatafa	—	4	9	5
Sminthopsis crassicaudata	—	5	5	7
Sminthopsis cf. *leucopus*	—	6	15	17
Dasyurus cf. *viverrinus*	—	18	4	4
Dasyurus cf. *maculatus*	10	9	12	16
Sarcophilus harrisii	—	1	—	1
*Sarcophilus laniarius**	1	—	—	—
Thylacinidae				
Thylacinus cynocephalus	1	—	1	2
Peramelidae				
Isoodon obesulus	—	8	53	184
Isoodon forma	—	2	—	—
Perameles gunnii	—	7	8	13
Perameles nasuta	20	—	7	9
Phalangeridae				
Acrobates pygmaeus	—	—	—	1
Cercartetus nanus	8	2	28	29
Petaurus breviceps	—	1	1	1
Trichosurus vulpecula	—	28	28	33
Pseudocheirus peregrinus	7	12	25	57
Phascolarctos cinereus	—	—	1	1
Vombatidae				
cf. *Vombatus ursinus*	3	6	6	7
Diprotodontidae				
*Zygomaturus trilobus**	1	—	—	—
Thylacoleonidae				
*Thylacoleo carnifex**	1	—	—	—
Macropodidae				
Bettongia gaimardi	—	2	1	1
Bettongia lesueur	—	11	4	2
Aepyprymnus rufescens	—	1	1	—
Potorous cf. *tridactylus*	9	36	97	302
Lagorchestes leporides	—	2	7	2
Onychogalea fraenata	—	1	—	—
Thylogale billardieri	3	18	11	6
Wallabia bicolor	7	—	1	5
Macropus rufogriseus	—	58	52	92
Macropus greyii	—	4	2	—
Macropus cf. *giganteus*	1	1	5	8
*Sthenurus gilli**	15	—	—	—
Sthenurus cf. *occidentalis**	3	—	—	—
Protemnodon cf. *brehus**	1	—	—	—

* Extinct Pleistocene species.

TABLE 3 (continued)

Family and Species	Minimum Numbers of Individuals			
	Pleistocene Layer	Recent Layers		
		Red Sand	Mixed Sand	Black Sand
Muridae			—	
Hydromys chrysogaster	—	—	1	—
Rattus lutreolus	—	8	32	63
Rattus fuscipes	105	13	58	119
Mastacomys fuscus	—	1	2	8
Conilurus albipes	—	6	13	11
Pseudomys shortridgei	—	4	10	45
Pseudomys australis	—	2	3	5
Pseudomys fumeus	7	—	—	1
Pseudomys novaehollandiae	—	2	7	3
Canidae				
Canis familiaris dingo	—	—	1	2
Totals:	236	280	569	1175

forests. *Isoodon obesulus* (Brown Bandicoot), *Potorous* cf. *tridactylus* (Potoroo), *Macropus rufogriseus* (Brush Wallaby) and *Rattus fuscipes* (Bush-rat) are the dominant species in this unit of the sediments.

In the Pleistocene Sediments, *Rattus fuscipes* is even more abundant, while *Antechinus stuartii* (Brown Phascogale) and *Perameles nasuta* (Long-nosed Bandicoot) are prominent. The numbers of *Wallabia bicolor* (Swamp Wallaby) and *Pseudomys fumeus* (Smoky Mouse) in these sediments contrast with their comparative paucity in the Recent Sediments. These five species are most abundant in Victoria today in areas with 40 to 50 inches or more rainfall per annum, such as wet sclerophyll forests of the Otway Ranges and east-central highlands, where *Eucalyptus regnans* (White Mountain Ash) and *Dicksonia antarctica* (Soft Treefern) are dominant. The absence of *Sminthopsis* (dunnarts), *Isoodon, Trichosurus vulpecula* (Brush-tail Possum), *Conilurus albipes* (rabbit-rat) and three species of *Pseudomys,* is significant, for all these animals are of dry sclerophyll forest or woodland habitats.

The most significant feature of the fauna represented by the figures in the second column is the presence of *Bettongia lesueur* (Boodie) and the *Isoodon* forma. In south-eastern Australia neither of these has been recorded as a living animal from areas having more than 10 inches rainfall per annum. *Macropus greyii* (Toolach Wallaby) and *Onychogalea fraenata* (Nail-tail Wallaby) are also animals of arid environments. *Antechinus stuartii, Perameles nasuta* and *Pseudomys fumeus* are absent, while *Isoodon obesulus* and *Rattus fuscipes* are comparatively rare in this section. The comparative abundance of *Trichosurus vulpecula* and of *Macropus rufogriseus* here is in keeping with an arid habitat fauna, as both these species extend today into Mallee areas. It is probable that some of the *Dasyurus* material that is listed is of *D. geoffroyi,* which is a Mallee animal. Insufficient is known of the ecology of the now-extinct mainland population of *Thylogale billardieri* (Tasmanian Pademelon) for comment to be made on its apparent concentration in this section of the cave sediments. (For distributional data of Mallee mammals, see Wakefield, 1966.)

Figures in the third column indicate a general trend from the arid environment fauna of the second column towards the modern dry sclerophyll forest fauna of the fourth column. However, some woodland species are proportionately more abundant in the third column than elsewhere in the table, for example, *Lagorchestes leporides* (Brown Hare-wallaby), *Pseudomys australis* and *Pseudomys novaehollandiae*.

In summary, Beauglehole's mammals, of Stage 1 of the excavation, indicate a sequence comprising an early wet sclerophyll forest fauna, then a mallee fauna*, then a fauna including some woodland species, and finally the modern dry sclerophyll forest fauna of the district.

Stage 2 of the excavation yielded a much greater bulk of mammal bones than those recovered during Stage 1. When they are sorted and classified, a more refined analysis of faunal succession should be obtained. In the meantime, the following points are noted:

Most of the bones from the Pleistocene Sediments are reddish in colour, unencrusted and unmineralized, but some, especially large bones, are grey in colour, mineralized and bear a thin cement-like encrustation. This suggests that there is a mixture of elements of faunas belonging to two different periods.

In the White Sand infilling the Stream Bed against the N.E. wall and the Floor Collapse cavity, there was material derived from the Pleistocene sediments and also clean yellowish bones of later origin.

Bones in the Reddish Sand and the Black Sand of the Recent Sediments were mainly reddish in colour and not encrusted.

Except for a few unaltered examples of very recent origin, bones throughout the deposit were generally of weak texture, being somewhat soft when moist and brittle when dry.

Some bones of extinct Pleistocene mammals, especially *Sthenurus*, were found in the Recent Sediments. This has evidently been due to their displacement from higher positions elsewhere in the cave. Beauglehole found a quantity of obviously old material, including *Sthenurus*, on a ledge several feet above the modern cave floor. Intrusions of this kind were usually recognized by the pigmentation, texture and surface character of the specimens concerned.

Notes on Identification of Mammals

Dasyurus spp. It is likely that some material from lower levels of the Recent Sediments belongs to *D. geoffroyi* rather than to the species to which it has been tentatively allocated.

Isoodon forma. This is the small form, originally abundant in the Murray-Darling junction area (see Wakefield, 1966).

Vombatus ursinus. This name is used comprehensively to include the common wombat of the Australian mainland, which has been referred to previously as *Vombatus hirsutus* and *Phascolomys mitchellii*. Some of the wombat material from McEachern's Cave may prove to be of *Lasiorhinus latifrons*.

Wallabia bicolor. The species is withdrawn from the genus *Protemnodon*, to which it has been allocated in much recent literature.

* Link (1967) reported a paucity of bones in and immediately above "Layer C" (i.e. the Calcarenite Sediments) and interpreted this as indicating "a dramatic reduction in animal population" associated with arid conditions, This line of reasoning cannot be supported, Aeolian material is not comparable with other cave sediments in this regard, and the reported paucity of bones was not a general feature of the sands immediately above the Calcarenite Sediments. Evidence of climatic change is provided by change in the composition of the fauna, not by paucity or abundance of bones in various parts of the cave sediments.

Macropus greyii and *M. rufogriseus*. These species have been placed variously in *Wallabia* and *Protemnodon* in recent literature.

Macropus giganteus. This name replaces *M. cangaru* and *M. major* for the Grey Kangaroo.

Sthenurus. The two species commonly represented in Victorian cave deposits are discussed by Merriles (1965).

Rattus fuscipes. The name is used comprehensively to include the forms previously known as *R. greyii* and *R. assimilis* (ref. Taylor and Horner, 1965).

*Pseudomys**. The genus is used comprehensively to include also species previously referred to *Thetomys*, *Gyomys* and *Leggadina*.

Pseudomys shortridgei. This species survives today in S.W. Victoria. Skeletal remains of it were not distinguished from those of *Pseudomys* (*Thetomys*) *gracilicaudatus* in other reports on western Victorian sub-fossils (e.g. Wakefield, 1964).

Pseudomys australis. This name is used comprehensively to include the form previously known as *P. auritus*.

Comparison with other Mammal Bone Deposits

Analyses of several other deposits from western Victoria have been presented by Wakefield (1964).

A number of these were of modern faunas, and in this category the material from Fern Cave (15 miles east of McEachern's Cave) is of interest as it presents a virtually identical list of species, in about the same proportions as regards individuals, as was found in the Black Sand of the Recent Sediments of McEachern's Cave. The coincidence became even closer with the discovery of a tooth of *Thylacinus* in the Fern Cave collection, a detail not included in previous published reports.

It was noted that the Skene Street cave at Warrnambool and the Mount Hamilton lava cave had each contained both modern fauna and extinct Pleistocene species, and that *Bettongia lesueur* had occurred in each. It was suggested that the *Bettongia* in southern Victoria indicated an arid phase between the Pleistocene and the present.

There is very close conformity between two faunas described from near Buchan in eastern Victoria (Wakefield, 1967) and two of those found in McEachern's Cave. The older Buchan fauna, dated at about 15,000 years B.P., contained an abundance of *Antechinus stuartii* and *Rattus fuscipes*, with *Perameles nasuta* and *Pseudomys fumeus* present but *Isoodon obesulus* absent and other species of *Pseudomys* scarce. The modern Buchan fauna, dated at about 2500 years B.P., showed a reduction in status both of *Antechinus stuartii* and *Rattus fuscipes*, the presence of *Isoodon obesulus* and increase in status of *Pseudomys* species. Buchan is 400 miles east of Nelson, but latitude, altitude, geology, climate and general vegetation are about the same in both areas.

Radio-carbon Date from Bones of Pleistocene Sediments

A sample comprising 373·4 gm. of mammal bones was extracted from the uppermost Pleistocene Sediments, from between 15 and 27 feet N.W. of the entrance shaft and from 0 to 2 inches below the base of the Calcarenite Sediments. The sample was made up of many hundreds of pieces of post-cranial bone, all of which were unencrusted, unmineralized and of dark colour. Light-coloured or miner-

* The revision which is indicated in this paper to the taxonomy of *Pseudomys* is based on unpublished work by J. A. Mahoney, Department of Geology and Geophysics, University of Sydney.

alized or encrusted specimens were rejected.

This material provided a radiocarbon date* of 15,200 ±320 years B.P. (GaK 509; Gakushuin University, Tokyo).

Jawbones associated with the postcranial bones which comprised the sample for dating provided the following data of species and approximate numbers of individuals represented:

Antechinus stuartii	14
Antechinus swainsonii	3
Dasyurus cf. *maculatus*	6
Dasyurus cf. *viverrinus*	1
Sarcophilus laniarius	1
Perameles nasuta	8
Cercartetus nanus	6
Pseudocheirus peregrinus	5
cf. *Vombatus ursinus*	1
Potorous cf. *tridactylus*	2
Thylogale billardieri	1
Wallabia bicolor	4
Sthenurus sp.	1
Rattus fuscipes	55
Pseudomys fumeus	4

Except for one detail—the paucity of *Sthenurus*—this analysis indicates a fauna virtually identical with that analysed in the first column of Table 1.

Because gravitational movement and water transportation probably mixed older and younger cave sediments, and because the sample comprised a large number of bones gathered from an area of several square yards, it is likely that the date obtained applies to a point in time somewhere about the middle of the period of accumulation of the higher Pleistocene Sediments. (For example, that period may have been from about 20,000 to about 10,000 years B.P.) However, when dates are obtained for further samples of organic material from elsewhere in the cave, it may be demonstrated that there is a more specific application of the original date.

* This radio-carbon date was erroneously reported by Link (1967) as "ca 14,300 B.P." and as applying to "bones from two to three inches below layer C" (i.e. the Calcarenite Sediments).

6. Late Pleistocene-Holocene Climatic Fluctuations

Gill (1955) gave evidence that, in south-eastern Australia, there had been late Pleistocene and Holocene climatic fluctuations corresponding to those recognized as having occurred elsewhere in the world, and he set out the following local sequence:

(a) Glacial Period, until about 8000 years ago, evidenced by lower sea levels, higher lake levels, and river terrace formation.

(b) Mid-Holocene Thermal Period, with maximum at a point between 4000 and 6000 years ago, evidenced by dry lakes and "loess dune" formation, higher sea levels, and river terrace oxidation.

(c) "Little Ice Age" period, between about 2000 and 3500 years ago, evidenced by higher lake levels and by river terrace formation.

Butler (1956) established the name "parna" for certain aeolian clays. He identified Gill's "loess" as dune parna and postulated that it represented a very circumscribed period of aridity divided from a previous period of widespread parna deposition by an intervening humid phase of considerable duration.

Emiliani (1957) reviewed data of fluctuations in surface temperatures of tropical sea water, obtained by oxygen isotope assay of foram tests in sea-bed cores, from the mid-Pleistocene to the present. These showed an alternation of phases of low temperatures (corresponding to glacial periods) and warm interglacial phases. A generalized graph showed the following details:

From 13,000 to 11,000 years B.P., temperatures rising rapidly from glacial minimum (about 5° C less than present); fluctuations from about 11,000 to 7000 years B.P. (between levels a little less than present); increase to present level at about 6000 years B.P.; from 6000 onward, temperatures above present, with thermal maximum (1° C above present) at about 4000 years B.P.

The graph shows no fluctuation to suggest the "little ice age".

Emiliani believed his time scale to be accurate to within 20 per cent.

Gill (1961) redrew part of Emiliani's generalized graph, calibrating it to the present local mean temperature of 58° F*. Radio-carbon dating data, relevant to sea levels, were discussed, indicating that levels higher than at present were associated with the post-glacial thermal maximum. These included dates of ~3700, ~3800 and ~5700 years B.P. Also, the date of ~8780 years B.P. was noted for a local sea-level 63 feet lower than at present, at which time, according to Emiliani's graph, tropical sea-surface temperature was about 1° C less than at present.

Gill (1966a) showed that the Colongulac parna dune was formed less than ~6435 years B.P.

Gill (1966b) published 11 dates, obtained by radio-carbon assay from beds of marine shells originally laid down below low tide level but now 6 to 7 feet above low tide level. These dates ranged from ~6500 to ~3900 years B.P., with the mean at about 5200. The hypothesis is that higher sea levels were associated with high world temperatures and deglaciation.

Drury (1967) gave an excellent review of data of Pleistocene-Holocene climatic fluctuations. He concluded (a) that in Australia there had been the same major fluctuations as elsewhere in the world—including a pluvial period from 23-24,000 to 14-15,000 years B.P., then fluctuations to about 10,000 years ago, (b) that deglacial conditions of heightened temperatures corresponded with depluvial conditions, and (c) that "hypotheses of increasing aridity at times of glacial maximum are opposed by abundant field evidence from a wide variety of existing climates".

Both the sedimentation in McEachern's Cave and the mammal remains which are associated with the sediments, provide evidence to support that already available of the following late Pleistocene-Holocene climatic fluctuations:

(a) Comparatively wet conditions during the latest Pleistocene glacial period.

(b) A mid-Holocene warm-arid period, evidenced at McEachern's Cave by (i) cessation of sedimentation due to ground-water movement, (ii) provision of diverse sediments due to wind erosion, and (iii) the presence of desert mammals.

(c) A subsequent period slightly wetter than at present. (However, the evidence in this case is of minor nature.)

The modern cave sediments, together with mammal remains in them, and knowledge of modern mammal populations in Victoria, provide control data with which relevant comparisons have been made.

A working approximation of evapotranspiration rate is given by the formula $E_t = \frac{t}{2}$ cm. per month, where t is Centigrade temperature (Fleming, 1966). This indicates that a decrease in mean temperature of 5° C, without change in rainfall, would have about

* In south-eastern Australia the temperature range between thermal maxima and minima should have been greater than for surface sea water in the tropics.

the same effect on accumulation and movement of ground water as would an increase in rainfall of 12 inches per annum without alteration in mean temperature. Thus, with mean temperature several degrees below present level, and without increase in rainfall, wet sclerophyll forests would be expected to occur in areas now carrying dry sclerophyll forests. On the contrary, to attain comparatively cold-arid ground conditions, extreme reduction in rainfall would be necessary.

The mean annual rainfall at Nelson has been 28·8 inches over the past 66 years, and the mean temperature should be the same as at Portland, namely 57° F (= 14°C). If conditions in that area in the mid-Holocene were indeed similar to those of the northern Mallee at present, then decreased annual rainfall and increased mean temperature are indicated for that period. For comparison, present mean annual rainfall and temperature at Mildura are 10 inches and 62° F respectively.

[Note: At the conclusion of discussion of the McEachern's Cave sediments, Link (1967) proposed a sequence of events including "formation of cemented frost breccia (calcrete) or aeolian deposits or both during an arid (possibly cold) climatic phase (ca. 8-11,000 years B.P.)". This referred to the accumulation of the Calcarenite Sediments. No evidence was advanced to support this suggested date, and no cognizance was indicated of any of the published data on palaeoclimates discussed in the present paper.]

7. Summary

McEachern's Cave is near Nelson, S.W. Victoria, in an area of dry sclerophyll forest. It is in Gambier Limestone, adjacent to calcareous dunes and quartz sands of Quaternary formations. There is a subterranean chamber, partly infilled with sediments, connected to the surface by a vertical shaft, and this has been a trap for terrestrial mammals.

Excavation and analysis of a section of the cave sediments has indicated the following sequence of events in the history of the cave:

(a) An old collapse of roof limestone to form a large cavern.

(b) Deposition of quartz sands derived from the surface, together with bones of mammals of a wet sclerophyll forest fauna. A radiocarbon date of ~15,200 years B.P. associates this deposition with the latest Pleistocene glacial period.

(c) Deposition of aeolian material derived from nearby calcareous dune formation, but from a variety of different points in the formation.

Surface sand entering the cave at about the time of the aeolian deposition was associated with fossils of desert mammals, indicating ecological conditions similar to those pertaining today in more northerly areas of higher mean temperature and lower annual rainfall than in the Nelson district now.

[Some evidence suggests that during this period the cave was connected to a much larger cave system and that that system contained an exposed water surface.]

(d) Three events occurred, but not neccessarily in the order given:

(i) Erosion by stream action of some of the aeolian and Pleistocene sediments, and infilling of the stream bed with white quartz sand.

(ii) A collapse of roof limestone, evacuating the upper arch which comprises the present unfilled chamber of the cave.

(iii) A floor collapse in part of the cave, and infilling of the collapse cavity with white quartz sand.

(e) Dispersal, above existing cave sediments, of reddish quartz sand, followed by infilling from the surface with blackish quartz sand associated with bones of the local modern dry sclerophyll forest fauna.

As only a very small fraction of the sediments in McEachern's Cave has been excavated, the site has valuable potential for future research, and this should involve techniques more refined than those employed to date.

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References

Boutakoff, N., 1963. The Geology and Geomorphology of the Portland Area. Geological Survey of Victoria, Memoir No. 22. Department of Mines, Melbourne.

Butler, B. E., 1956. Parna—An Aeolian Clay. *Aust. J. Sci.*, **18**: 145-151.

Drury, G. H., 1967. Climatic Change as a Geographical Backdrop. *The Australian Geographer*, X(4): 231-242.

Emiliani, C. E., 1958. Paleotemperature Analysis of Core 280 and Pleistocene Correlations. *Journ. Geol.* **66(3)**: 264-275.

Fleming, P. M., 1966. Crop Requirements and Irrigation. Unpublished paper, World Meteorological Organization Regional Seminar on Agrometeorology, Melbourne, November-December, 1966. CSIRO pamphlet, SAM-I/Doc. 22 (7.X.1966).

Gill, E. D., 1955. The Australian "Arid Period". *Aust. J. Sci.*, **17**: 204-206.

Gill, E. D., 1961. Eustasy and the Yarra Delta, Victoria, Australia. *Proc. Roy. Soc. Vict.*, **74(2)**: 125-133.

Gill, E. D., 1966a. Geochronology of Victorian Mallee Ridges. *Proc. Roy. Soc. Vict.*, **79(2)**: 555-559.

Gill, E. D., 1966b. in, Australian Research in Quaternary Shorelines. *Aust. J. Sci.*, **28**: 407-411.

Horner, B. E., and Taylor, J. M., 1965. Systematic Relationships among *Rattus* in Southern Australia. Evidence from Cross-breeding Experiments. *CSIRO Wildl. Res.*, **10**: 101-109.

Link, A. G., 1967. Late Pleistocene-Holocene Climatic Fluctuations; Possible Solution Pipe-Foiba Relationships; and the Evolution of Limestone Cave Morphology. *Zschr. Geomorph.*, **11**: 117-145.

Ollier, C. D., 1964. McEachern Cave, Nelson. *Vict. Nat.*, **81(7)**: 195-197.

Merriles, D., 1965. Two Species of the Extinct Genus *Sthenurus* Owen (Marsupialia, Macropodidae) from Southeastern Australia, including *Sthenurus gilli* sp. nov. *Journ. Roy. Soc. W. Aust.*, **48(1)**: 22-32.

Wakefield, N. A., 1964. Recent Mammalian Sub-fossils of the Basalt Plains of Victoria. *Proc. Roy. Soc. Vict.*, **77(2)**: 419-425.

Wakefield, N. A., 1967. Mammal Bones in the Buchan District. *Vict. Nat.*, **84(7)**: 211-214.

Book Reviews

Freshwater Tortoises of Australia and New Guinea

By JOHN GOODE

(Published by Lansdowne Press, Melbourne, 1967)

9½" x 7". 154 pages—including 24 full colour plates, 138 in half-tone, and 8 figures giving anatomical details and distribution throughout the mainland and New Guinea. Identification keys for both long-necked and short-necked species are also given. Price $8.50.

It is almost 200 years since Sir Joseph Banks discovered for the first time the Australian Long-necked Tortoise—and not until now has a full length book been published, which is devoted entirely to these animals and related species.

As the author writes, it seems unlikely that any other animal which is so well known to so many people, could have been taken for granted for nearly two centuries.

Indeed, how often have we come upon one, and been able to identify it merely as "a tortoise". Or perhaps we have felt concern for the future of one that has been confined within a suburban garden by means of a length of string, attached through a hole in the carapace. Yet through sheer lack of knowledge of the animal's needs and habits, have been unable to advise on its well being.

With the publishing of this work however, we have at last a reference which will not only cater for students, and Herpetologists; but the lay person also. And this is most important, for it is stated that at least 10,000 Australian freshwater tortoises per year are sold by dealers who are largely ignorant of the animal's basic needs, to an equally ignorant section of the community.

The Introduction and Chapters 1 and 7 give the reader some idea of the evolutionary niche into which these animals fit, and some of the characteristic features. We find here too, the difference between tortoises and turtles.

The following three chapters contain the major part of the work, and set down the factors in the taxonomy of the Chelidae, with information on each species of Long-necked and Short-necked tortoise. This information comprises a general description and distribution of each tortoise; together with details of the embryonic, juvenile and adult stages, and breeding habits where known. Also included with each species are a detailed description of major characteristics, and a table of anatomical measurements.

The excellent illustrations which accompany each section, weld the whole into a comprehensive reference; which should leave little doubt in the reader's mind of the identity of any one species met with in the field.

The remaining chapters are devoted to the distribution of the Chelidae in Australia and New Guinea, the breeding, biology, structure, physiology, senses and behaviour, and finally the care of the tortoises in captivity.

A checklist, bibliographies, both specific and general, and a glossary complete this extremely valuable publication. Full marks must also be given for the attractive design of the book, and for the excellently rendered colour illustrations.

One minor criticism is that specific plate numbers are a little difficult to locate in the index, until one grows accustomed to the italic system.

G. M. W.

Australian Reptiles in Colour

By HAROLD COGGER

(Published by A. H. and A. W. Reed Pty. Ltd., Sydney, 1967)

7½" x 7" approx. 112 pages—including 50 colour plates. Price $3.50.

Although the title of this publication may suggest merely a pictorial record of some of the Australian reptiles, it is obvious after noting the author's name and opening the book, that it is much more than this.

Mr. Cogger, who is Head of the Department of Reptiles and Amphibians at the Australian Museum, has selected a varied cross section of Australia's reptile family; and by combining some excellent colour photographs with a general but authoritative text, has produced a most useful reference, as well as a valuable introduction to our reptiles for those not yet familiar with them.

As the author indicates, no attempt has been made to discuss the general characteristics of reptiles, for many technical books are available for this purpose. The main aim has been to outline briefly the family characteristics together with the habits of some of the more common species.

The selection of reptiles included in the book ranges through the geckos, monitor and snake-lizards, dragons, skinks and blind-snakes to pythons, venomous snakes, crocodiles, tortoises and sea-snakes.

Conservation of reptiles is treated briefly at the beginning of the book, together with a most interesting comment on the concensus of medical opinion today, for the treatment of snake-bite.

It is unfortunate that the section dealing with tortoises was perhaps a little premature, in view of the fact that with the recent publication of a work dealing specifically with these reptiles, far more of their natural lives and habits have become known.

However, for those with only a casual interest in this field, the content in this chapter may be sufficient.

The colour illustrations, largely photographed by the author, are excellent, and as is the case with most foreign printing houses, faithful and accurate colour control has been achieved with their reproduction.

Because of the reasonable cost, and the varied field of the reptile world which this book covers, it is certainly a most welcome addition to the nature student's library.

It is perhaps not too presumptuous to hope that the same author has in mind for the future, a similar book dealing with the amphibians of Australia.

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Field Naturalists Club of Victoria

General Meeting—13 November

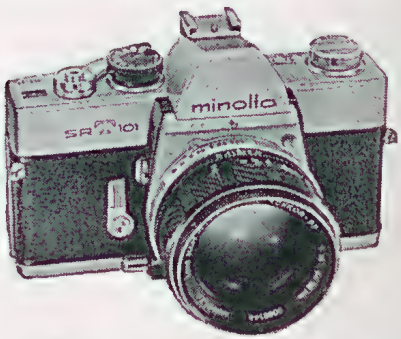
About 120 members were present. The Secretary, Mr. D. Lee, read a letter from Mr. Lloyd Williams resigning as President of the Club due to increasing ill health.

The council had asked Mr. E. S. Allen (Sales Officer for many years) to act as President and he has agreed to act until the end of the year. Mr. Allen then occupied the chair and was welcomed. The meeting carried a motion that "The Club notices with regret Mr. Williams' illness, and thanks him for his valuable service to the club and hopes that his health will improve to allow him to attend meetings".

The Secretary announced the conditions for nominations for the Royal Society's Silver Medal. He also reported on an enquiry from the National Parks Authority for a report by a F.N.C.V. Committee on the suitability of the Brisbane Ranges as a National Park. The Secretary announced the death of Mrs. Howe, widow of the late Mr. Frank Howe—a keen ornithologist.

Mr. Lee drew attention to a Herald report of an attack by Mr. Chipp on the ABC TV-program "Four Corners", which reported extensive damage in the Barrier Reef. Mr. Chipp said it was exaggerated and that this appalling knocking publicity was bad for tourism.

The report on the address given at this meeting will appear in the *Vict. Nat.* for January 1968, along with Group Reports from November Meetings.



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GENERAL MEETINGS

Monday, 11 December—At National Herbarium, The Domain, South Yarra, commencing at 8 p.m.

1. Minutes, Reports, Announcements.
2. Correspondence.
3. Subject for the evening—An address by Mr. L. Edgar of the Natural Resources League.
4. Election of new members.

   (a) *Ordinary:*

   Mrs. Joan Garde, 184 Warrigal Road, Burwood 3125.
   Mr. L. J. Harris, 8 Wharton Street, Surrey Hills 3127. (Interest—Microscopy.)
   Mrs. B. Ramsden, 388 Dandenong Road, Nth. Caulfield 3161.

   (b) *Country:*

   Mr. M. H. Douglas, 13 Kooyong Street, Horsham 3400.

   (c) *Junior:*

   Julian K. Ludowici, 33 Lucinda Ave., Wahroonga, N.S.W. 2076.

5. General Business.
6. Nature Notes and Exhibits.

GROUP MEETINGS

(8 p.m. at National Herbarium unless otherwise stated)

Monday, 8 January 1968—Subject: Members' Night. Those wishing to take part in this evening should contact the Secretary or Mr. E. Hanks.

Thursday, 14 December—Botany Group. Members' Night and Christmas Breakup.

The Microscopical Group will not meet in December; and the Geology, Botany, and Entomology and Marine Biology Groups will not meet in January.

F.N.C.V. EXCURSIONS

Sunday, 10 December—Flinders. The subject will be marine biology and the excursion will be led by Mr. R. L. Jentz, who spoke to the Club recently on Polychaete Worms. The coach will leave Batman Avenue at 9.30 a.m. sharp. Fare $1.50. Bring two meals.

26 December 1967 to 1 January 1968—Portland. The coach will leave Melbourne at 9.00 a.m. on Boxing Day, from near the Gas and Fuel Corporation building in Flinders Street. Bring a picnic lunch.

Field Naturalists Club of Victoria

Established 1880

OBJECTS: To stimulate interest in natural history and to preserve and protect Australian fauna and flora.

Patron: His Excellency Major-General Sir Rohan Delacombe, K.B.E., C.B., D.S.O.

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Entomology and Marine Biology: Mr. J. W. H. Strong, Legislative Council, Parliament House, Melbourne, 3002.

MEMBERSHIP

Membership of the F.N.C.V. is open to any person interested in natural history. The *Victorian Naturalist* is distributed free to all members, the club's reference and lending library is available, and other activities are indicated in reports set out in the several preceding pages of this magazine.

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CORRIGENDA

"The Genus Corybas in Victoria"
Victorian Naturalist, **86**, pp. 38-9.

Figure 1

To indicate scale × 1
Horizontally—
flower side,
flower front,
leaf.

Figures 1 and 2

1. *Corybas aconitiflorus* Salisb.
2. *C. diemenicus* (Lindl.) Rupp
3. *C. dilatatus* (Rupp et Nicholls) Rupp.
4. *C. fimbriatus* (R. Br.) Reichenb. f.
5. *C. unguiculatus* (R. Br.) Reichenb. f.

Figure 2

Horizontally—
labellum longitudinal section × 2, column side × 6, column front × 6.

"Ecological Valence of Mountain Ash (*E. regnans*, F. Muell) as a Key to its Distribution"
Victorian Naturalist, **86**, pp. 8, 10, 19

Figure 1

Relief Map of Dandenong Range, Victoria, Australia.

Figure 3

Distribution of Mountain ash (*E. regnans*) in the Dandenong Range.

Figure 2

Photograph taken on 18 January 1962, one day after the passage of the 14-17 January bushfires. All the understorey scrub has been razed by fire. The thick fibrous bark of the messmate (*Eucalyptus obliqua*) trees has been charred black but the smoother bark of the mountain grey gum (*E. goniocalyx*), found lower down slope has not been burned. The upper leaves have all been killed by radiant heat and later fell to the ground. Note that messmate typically replaces mountain grey gum on the higher ridges as exposure to sun and wind increase.

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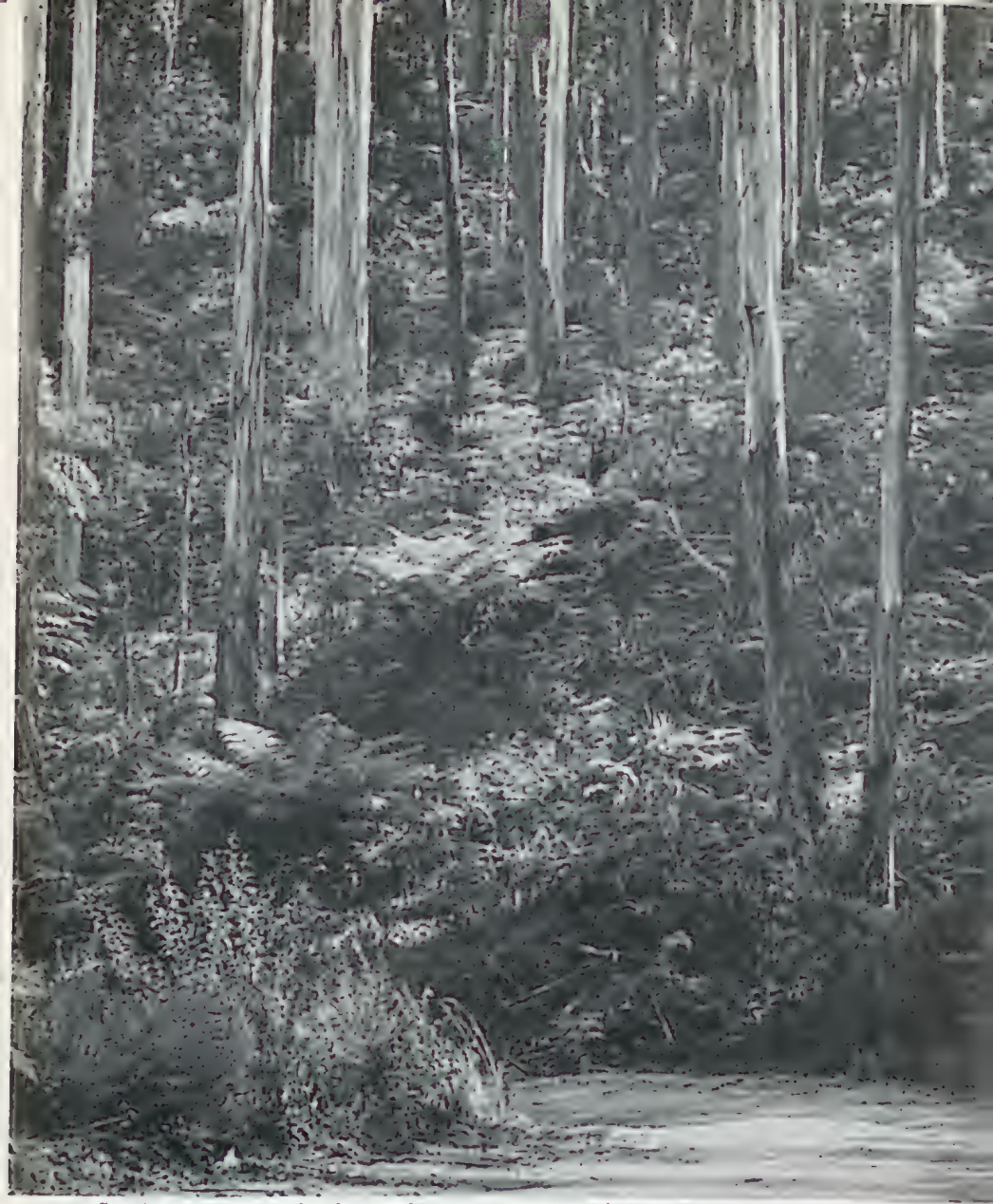

Stand of Messmate Stringybark and Manna Gum—Mt. Cole State Forest.

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The Victorian Naturalist

Editor: G. M. Ward
Assistant Editor: W. White

Vol. 85, No. 1 January, 1968

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Front Cover:

The Spotted Bower Bird at its bower was photographed by Graham Pizzey at Kulkyne, on the Murray River in Victoria.

Readers' Nature Notes and Queries

These columns are available for all members, young and old, to bring before others their own observations in nature. Correspondence may be sent to the Editor, 54 St. James Road, Heidelberg.

Mr. Victor Jacobs of Narre Warren North, has contributed many articles to the *Victorian Naturalist*, and rather than include this most recent article as a whole, it will appear in these columns as a series of notes. His introduction should inspire other readers.

An associate of my daughter rerently arrived at work somewhat footsore after a lengthy bush walk, but amply rewarded by what he had seen. A member of the F.N.C.V., he had discussed an article of mine with her within the past few days, so that when he mentioned his walk, she asked why he had not written of his trip, and submitted it for publication. He indicated that it was beyond him. I do not believe this for one moment, and is the reason for these articles.

A numerical survey of authors from Volume 83 of the *Victorian Naturalist*, including those of book reviews and "Bush Brushes", gives a total of fifty-one different contributors out of a total of 1500 members. This is a fairly low percentage of people having articles printed, yet I feel certain that many hundreds must have notebooks crammed with valuable and readable information that could, with a little determination, become accessible to our readers.

This train of thought originated while perusing Roy Wheeler's new and most valuable book, "A Handlist of the Birds of Victoria". I noted that the map dealing with the White-fronted Chat showed a statewide distribution and I read his comment that it is common. This rather surprised me, as I had only seen this species in two localities in a period of six years. These records were made, firstly, on the dry lake bed at Lake Brambruk in Wyperfeld National Park in 1963, and secondly, a few weeks ago along the roads north of Sandy Point near Waratah Bay. While appreciating the amount of research put in by Mr. Wheeler and the other ornithologists, on whose records he has drawn, I could not but wonder how many recent sightings are involved in this particular work.

There can be little doubt about the fact that the information in the private records at present in the possession of many of our members, would ease the task of anyone, who like Mr. Wheeler, sets about the task of compiling analyses of our flora and fauna.

From the members' point of view, such records may fill a dual role. In the first place, the stimulation of attempting to put into words, impressions received by the senses will activate a greater skill in observation, and, secondly, the extra information submitted for publication, as already suggested, will be of great value to natural historians in general.

I am well aware that notes do pile up, as I have been jotting small notes on odds and ends of paper and slipping them into labelled envelopes for a number of months. There had always been the thought in the back of my mind, that a few more visits to the places in question would result in enough material being available for the writing of a complete article. However, the extra visits, being so long in eventuating, have caused the exact opposite to happen: they are witholding material that could be of value.

Here is the first of Mr. Jacob's short articles—

The Grampians

In April of 1966 I was on the road to the pinnacles, from the south, where Cranberry Heath and Green Groundberry were abundant and in flower. *Acacia rupicola* had a few blooms, while the occasional *Hibbertia stricta* and white caladenia were seen. Large clumps of *Correa speciosa,* and also *C. reflexa rubra* made patches of colour.

The day, being gusty with threatening ragged clouds, was not a bird day; yet Eastern Spinebills (See *Vict. Nat.* Vol. 83(8), August 1966, page 201), and Yellow and Scarlet Robins were seen.

On the following day I walked to Clematis Falls. Here, good specimens of *Acacia longifolia* were seen.

Birds noticed included White-browed Scrub Wrens, White-throated Tree Creepers, Yellow Robins, Eastern Spinebills, White-eared Honeyeaters (abundant), Red Wattle Birds, Grey Fantails, Grey Thrushes, a flock of Orange-wing Sitellas, Kookaburras and White-naped Honeyeaters.

On the third day, I climbed to the summit of Mt. William, where the White-browed Scrub Wrens were active in the presence of passers by, hopping and bouncing over rocks and boulders.

The leaves of *Banksia integrifolia* at 2,800 feet were almost entire.

Having a four year old Grampians Gum at Narre Warren North less than two and a half feet in height, I was interested to see this species as we climbed. On the lower slopes the trees were up to twelve feet in height, and their leaves were far more ovate than the specimen at home. Not until we reached the summit, did we observe the dwarfed specimens with almost orbicular leaves, clinging precariously to the fissured rocks.

A Note on Wolf Spiders

These notes on an observation of a most interesting species of spider, come from Mrs. Ellen Lyndon of Leongatha.

We were coming down the gravelled highway on Tongio Gap, between Omeo and Swift's Creek, late in March. The long dry spell appeared to be about to break, and a storm had brought a little rain the night before; but this afternoon was fine and sunny and the ground hardly dampened. Two or three car-lengths ahead a small animal showed black against the roadbed, a creature short in body but standing well up on long legs. As we drew level and passed we saw that it was a huge spider so we stopped in a hurry and ran back to have a look at it.

It was one of the Wolf Spiders of the family Lycosa, and quite the largest we had ever seen, measuring, when relaxed and flat to the ground, over 2½ inches from the tip of the front to the tip of its rear pair of long slender legs. Color was generally light brown, with a striking lighter colored pattern on the convex carapace. This could best be described as a heart-shaped leaf pattern with a squared off tip where the spider's eyes would be. A white-edged leaf with a broad central midrib, widest between the eyes, tapering off to the stem-end next to the abdomen, with three clearly defined whitish veins running off to each side. The abdomen was quite obscured by a mass of spiderlings clinging to the mother's back. Advancing from the opposite side of the road was another similarly loaded spider, apparently the twin of the first.

For all their size, they were timid creatures, flattening down between the stones in a vain effort to hide. They showed no hostility on being manoevered round with a stick, even when part of the load fell overboard. The little spiders on hitting the ground merely scattered in confusion and made no obvious effort to follow the parent. A close search up and down the road in the vicinity, where there was long dry grass, and stones, failed to locate sign of any other spiders; nor had we noticed any in the district in the previous week. It seems odd that we should just happen to come along at the very time that these two burrowing spiders should be abroad with their offspring.

Females of the Lycosidae have frequently been reported as carrying the spiderlings on their backs.

A photograph of a female Wolf Spider and spiderlings appears in the *Victorian Naturalist,* **82** p. 117. (Ed.)

Wasp and Funnel-web Spider

Here is another interesting report on insect behaviour from Mr. Alfred G. Fellows of Alabama Hill, Charters Towers, Nth. Queensland.

Passing along a garden path on which much grass-litter lay, a loud deep-toned humming drew my attention to a huge mason-wasp that was jerkily, endeavouring to drag a large funnel-web spider over the grass.

At each pull by the wasp, it gave out the deep sound, and it seemed that the wings helped as much as the legs.

As evening was well advanced, I hastily clipped a "close-up" lens on the camera, and walked slowly along with the camera eighteen inches above the wasp and spider. After travelling about three feet, the wasp found even rougher going. Suddenly it dropped the spider, flew past me, and then round in a circle to apparently locate its mud-nest somewhere nearby.

I awaited its return, but a half tamed broken-legged butcher bird, that has adopted us to the extent of coming each evening for a meal of raw meat, had been watching the operations too.

Suddenly she dived and scrambled down, seized the spider, and just managed to "take off" as a deep humming sound told of the wasp's return.

Then away went the wasp a few seconds too late after the butcher bird, but it soon came back and flew wildly around me. I did not move, and only did so when a hopeless and fruitless search was begun by the luckless wasp. It had all happened in a very short time. A quarter of an hour later the butcher bird was on our back step, quite as eager as ever for its evening meal.

Birds of Altona Area

These notes of a successful day of bird-watching come from Mr. R. Marston of Reservoir in Victoria.

During a day spent in the Altona area on September 7, the following observations were made.

While driving on the road that leads to Werribee South, and about ½ mile from the coast, I was astonished to see a male Cockatiel perched on a telegraph wire. Normally a bird of the dry inland, they penetrate to the coast only during times of drought. Retracing our route back to Altona, a stop was made at the Altona Salt-Works, where Greenshanks and Marsh terns were noted. During low tide at Altona beach, several hundred Curlew Sandpipers and Red-necked Stints, together with a few Golden Plovers, Red-capped Dotterels and Bar-tailed Godwits were feeding energetically on the exposed mud-flats. Out to sea, Australian Gannets, Crested Terns and Little Pied Cormorants were fishing. The rest of the afternoon was spent at the Golf-links Swamp, where Japanese Snipe, in particular, abounded. Also noted here were White-headed Stilts, Marsh Sandpipers, Red-necked Stints, Curlew Sandpipers and Red-capped Dotterels. The Marsh Crake was flushed from some dense reedbeds. Weather conditions throughout the day were fine and sunny, and excellent views were obtained of all species observed.

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Pollination of *Spiculea Huntiana* (Elbow Orchid)

By E. R. Rotherham

Fifty years ago in 1917, A. B. Braine discovered the first Victorian specimen of *Spiculea huntiana* in the Cravensville district of North Eastern Victoria. For a number of years this remained the only known Victorian locality of this orchid. However, by the late 1940's the range of the orchid had been considerably extended, and it was recognized as being widespread in many of the peppermint, and stringybark-messmate forest areas, and in the alpine and sub-alpine areas of the State; and was in some areas often locally abundant.

In January this year I located (after considerable searching), in the Kinglake area, the first of these curious and bizarre orchids that I had seen. As it was almost dusk, and too late to successfully secure photographs, two plants with their associated earth were collected to be examined and photographed in the ensuing weeks.

On the morning of 10th January, an insect was observed to visit one of the flowers, but as this was some distance away it was impossible to see if pollination took place or to identify the insect. On examination, the pollinia of two of the flowers were seen to be missing, but this had not been checked before.

Unknown at this stage was the fact that Mr. Swaby had suggested in the *Victorian Naturalist* of December 1949, that a watch should be kept for the insect which may be responsible for the pollination of the Elbow Orchid. A considerable feeling of disappointment that the insect had not been more closely observed did exist, although at that time, no thought existed that this was possibly a first observation.

At 4 p.m. on the afternoon of 10th January, some photographs had been taken of the flower head of the orchid, and with the film almost finished, it was decided to secure a reasonable close-up picture of a single flower and its ornate labellum. The camera was focused, but the gusty wind blowing had set the labellum into a violent swinging motion. The electronic flash was being held at the selected distance waiting for a lull in the wind and the subsequent stilling of the movement. Viewing was through the camera lens.

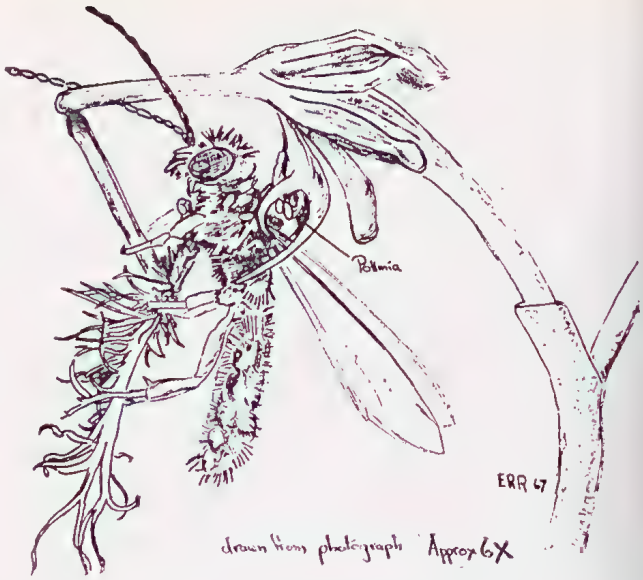
Suddenly an insect was present! The camera was fired, rewound and fired again, the insect still hanging onto the labellum. Then, as anticipated, the film finished.

Fortunately a second camera, loaded with a previously untried colour film was immediately available. The cameras were interposed, and one further photograph secured. As things eventuated this last picture though slightly under-exposed was the best, and from it the accompanying drawing was made. The other two pictures show the insect with its abdomen pressed close against the labellum and the pollinia deposited on the back of the thorax. The flower was kept under observation and the ovary started to develop. On 29th January, nineteen days after the visit of the insect, the ovary ripened and seed was present.

One interesting point arises from this observation.

Did the insect visiting the flower, already have the pollinia of a second orchid present? If so, and it would appear necessary for pollination, was it the same insect observed earlier in the morning?

This is extremely unlikely; but it does prompt one to speculate as to whether *Spiculea huntiana* is growing (as yet unrecorded) in the Warrandyte area.



(Note: Due to processing, the above illustration is approximately 4×)

The insect that pollinated the orchid discussed has been identified as a male Flower Wasp of the family Thynnidea, and of the *Rhagigaster* genus. This is essentially an Australian family of wasps, species of which are frequently seen on hot days visiting tea tree blossom and other native flowers. The female wasps are entirely wingless and the male wasp seeks them out. Mating takes place during flight, with the male wasp carrying the female which attaches herself to his abdomen. When fertilized, the female drops to the ground and burrows into the earth in search of a Scarab beetle grub on which to lay her eggs.

It appears that the pollination process of the Elbow Orchid by the Flower Wasp is achieved in the following sequence.

The wasp grasps the insectiform labellum with its head near the glands at the top of the labellum. The momentum of the insect landing on the hinged labellum causes the insect to be swung up towards the column as though on a pendulum and the thorax of the wasp is directed between the claw-like appendages of the column, and thus into contact with the pollinia, which then adheres to the back of the wasp's thorax. The fertilization procedure observed occurred on a day of gusty wind, but even so, the insect was associated with the orchid for a period of 6-8 seconds before being blown free or flying away.

References

Garnet, J. R., and Nicholls, W. H.—*Victorian Naturalist.* Vol. **64**. 246-7.
Swaby, A. J.—*Victorian Naturalist.* Vol. **66**. 142.
Williams, W. L.—*Victorian Naturalist.* Vol. **70**. 71.
Rica Erickson—*Orchids of the West.*
Gray, C. E.—*Victorian Native Orchids.* Vol. 1.
Willis, J. H.—*Plants of Victoria.* Vol. 1.

No. 10
Pilobolus

By H. A. DADE

The dung of herbivorous animals is exploited by a large number of interesting microfungi, most of which occur only on this material. The majority are phototropic: they shoot their spores in the direction of the brightest light, which indicates an unobstructed space in the surrounding herbage, after aiming their spore-bearing organs like miniature guns. The spores land on grass or other leaves, which are likely to be eaten by grazing animals. The ingested spores are then prepared for germination by the digestive juices, and pass out in the excreta, in which the new mycelium develops, and the life cycles of the fungi begin again.

Three species of *Pilobolus*, a genus of the Mucorales, occur in Victoria. One can be almost certain of getting a profuse growth of *P. kleinii* on any lump of fresh horse dung collected in a field and incubated at air temperature in a dish with a glass cover, kept in the light and prevented from drying by placing the dung on wet sand, blotting paper, or moss. Two or three days later crowds of sporophores will develop, first taking the form of yellow pins (Fig. 1, A) which usually develop in the evening. The heads of the pins quickly blacken, the stalks lengthen, and just below the caps the stalks become inflated into ovoid, glass-clear vesicles, studded with glistening drops of moisture (Fig. 1, B). They are then very beautiful objects, to or three centimetres

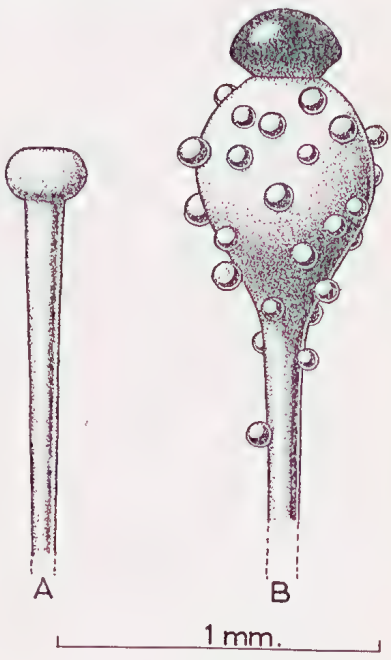


Fig. 1

Drawn: H. A. Dade

in height, sometimes more, and can be examined with a low power of the microscope (a 2-inch objective is suitable) in strong top-lighting.

The stalks are more or less upright at first, but when the rays of morning light fall on them they bend over, pointing their black caps towards the light. The vesicles act as lenses, focusing the light rays on to their inner walls (Fig. 2, A); this stimulates the stalks to bend over until the bright focused spot moves to the bases of the vesicles (Fig. 2, B). The vesicles become turgid, and the internal pressure of their fluid contents increases until, usually in the middle of the day, a ring of thin membrane round each cap is ruptured, and the cap is blown off with great force, soaring through the air (to a distance of a few feet in the field), while the vesicle collapses like a pricked balloon (Fig. 2, C). A globule of sticky mucilage comes away with the cap (Fig. 2, D). The upper surface of the cap is unwettable, and surface tension causes the cap to turn over on impact (Fig. 2, E); thus it adheres firmly to the leaf on which it falls, or to the lid of the incubation dish, where the caps collect and are easily seen as small black dots.

The caps are sporangia, each filled with hundreds of yellow spores. These can be examined under the microscope with a 1/6-inch or higher objective, if a few sporangia are scraped off the lid and rubbed up in water: they are oval or oblong bodies, 10 to 15 by 7 to 10 μ.

The name *"Pilobolus"* is appropriate: it means "cap-missile". We owe this knowledge of spore dissemination to A. H. R. Buller (Researches on Fungi VI, 1934).

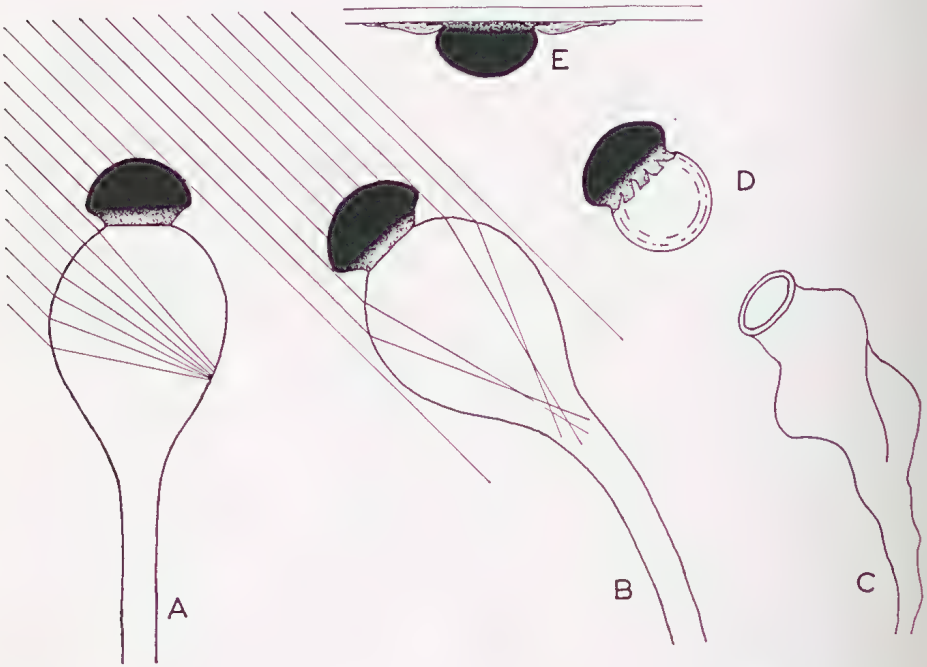


Fig. 2

Drawn: H. A. Dade

Spartina in Victoria

E. C. F. Bird and K. G. Boston*

During the past forty years, several attempts have been made to introduce the salt marsh grass commonly called Rice Grass or Cord Grass, to estuaries, lagoons, and swamps on the Victorian coast. Known to botanists as *Spartina townsendii*, this grass is believed to have originated about a century ago in the estuarine marshes bordering Southampton Water in southern England, as a result of hybridization between the native British species *Spartina maritima* and one of the North American species, *Spartina alterniflora*, presumably introduced accidentally. The new grass spread rapidly to other estuarine sites on the south coast of England, and recognition of its value as a means of stabilizing and reclaiming tidal mudflats led to its introduction to many estuaries on the coasts of Britain and Western Europe, where it has since become extensive. Attempts have been made to establish it in similar areas in other parts of the world, and a recent survey (Ranwell, 1967) showed that it is now found in a number of localities in New Zealand, Tasmania, and south-eastern Australia, where native species of Spartina do not occur. Before considering the details of its Victorian distribution, it will be useful to review some of the ecological features of this grass, and to indicate the advantages and disadvantages of introducing it to new areas.

Spartina townsendii is a highly variable plant, with both fertile and sterile forms. Marchant (1963) found that the original parent species, *S. maritima* and *S. alterniflora*, had chromosome counts ($2n = 60$) and ($2n = 62$) respectively, while the chromosome numbers for material identified as *S. townsendii* were 62 (sterile form) and 120, 122, and 124 (fertile forms). Lambert (1964) reported plants with intermediate characteristics, having chromosome counts of ($2n = 90$) and ($2n = 76$), suggestive of back-crossing. The original type-specimen, named by H. and J. Groves, was in fact the sterile form, so that nomenclature will have to be revised, but meanwhile it is convenient to refer to the various derivatives collectively as *Spartina townsendii* (*sensu lato*).

The forms of *Spartina townsendii* (*s.l.*) are all halophytic, rhizomatous, perennnial grasses, and it is difficult to distinguish them morphologically. The fertile forms usually have longer stamens and yellowish pollen, and produce seed; the sterile form develops denser tussocks, with about twice the number of shoots per unit area found in the fertile forms (Hubbard, 1965), and spreads by lateral growth of rhizomes, or establishment of drifted fragments capable of continued independent growth. Spreading rhizomes produce radially expanding tussocks which eventually merge into an extensive grassy sward.

* Dr. Bird is Reader in Geography, University of Melbourne, and Mr. Boston is Lecturer in Geography, Secondary Teachers College, Carlton.

Ranwell (1967) has summarized the geographical and ecological limits of *S. townsendii* (*s.l.*). It is a temperate zone species, plantings in tropical regions having failed to survive. In the northern hemisphere, it extends from coastal marshes in Brittany (latitude 48° N.) to similar sites in Cromarty Firth on the east coast of Scotland (57° 40′ N.). Failures to establish farther north have been attributed to excessive frost damage. In the southern hemisphere it establishes only slowly, grows sparsely, and produces little seed in the estuaries on the Auckland peninsula north of 37° S., evidently because the winters are too mild for its normal development. A similar limitation is in evidence on the South Coast of New South Wales. It is doubtful if excessive frost damage is a limiting factor anywhere on the coasts of Tasmania or New Zealand, for growth is vigorous and extensive in southernmost New Zealand (46° 36′ S.).

S. townsendii (*s.l.*) grows best on accreting tidal mudflats (Figures 1 and 2) up to mean high spring tide level and down to a level subject to inundation for not more than 6 hours at high tide in the growing season (Ranwell *et al.*, 1964). There is generally little if any other vegetation in the lower part of this zone, so that Spartina is able to utilize a vacant ecological niche. Regular inundation by sea water is necessary for optimum growth, and plantings on the shores of estuaries or lagoons with limited tide range have rarely spread far. Its best growth is on muds (mixtures of silt, clay and organic matter), but it will also grow, rather less vigorously, where the intertidal zone is sandy.

Where conditions are suitable, *S. townsendii* (*s.l.*) develops a rhizome system which binds and consolidates

Fig. 1

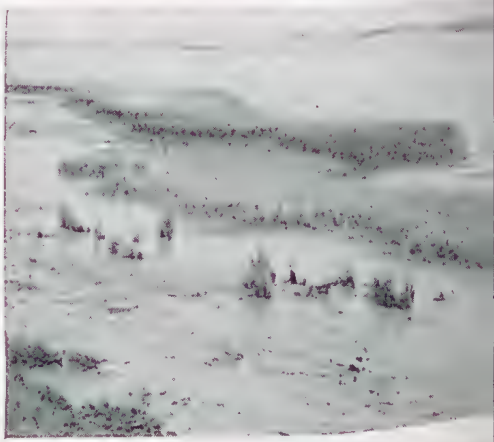


Fig. 2

the marshland surface, while the filtering action of its stems and leaves intercepts sediment washed in by the tide. A Spartina cover thus promotes accretion of sediment in the upper intertidal zone, building up a broad depositional terrace at about mean high tide level. In Bridgwater Bay, on the English coast, a muddy foreshore has been raised 5 feet since the introduction of *S. townsendii* (*s.l.*) in 1929, and the Spartina terrace is now up to 220 yards wide. Similar features have developed in estuaries and embayments on the south and east coasts of England, in northern France, and in the Wadden Sea which borders the

low-lying coasts of Holland, Germany, and western Denmark. In Australia, a Spartina terrace has developed on mudflats bordering the Tamar estuary in northern Tasmania.

S. townsendii (*s.l.*) is therefore an important geomorphological agent, influencing the mode and pattern of sedimentation in estuaries and coastal embayments. As the terrace builds up to high tide level, Spartina can be invaded from the rear by other species; in Britain the invaders are *Phragmites communis* and *Scirpus maritimus* on ungrazed, and *Puccinellia maritima* on grazed, marshland (Ranwell, 1961); *Phragmites* invasion is more vigorous on sites where salinity is diminished by freshwater runoff from adjacent land.

Some uses of Spartina

S. townsendii (*s.l.*) has been used in Britain to impede wave action and reduce erosion on the shores of tidal embayments and muddy estuaries, as in Bridgwater Bay and the Severn estuary, to stabilize mudflats in order to reduce the rate of silting in navigable channels, as in the Thames estuary, and to promote sedimentation in preparation for agricultural land reclamation, as on the shores of the Wash and on the coasts of Holland and Denmark. In the Southampton district, Spartina marshland has been embanked and reclaimed for industrial development.

Older breeds of sheep and cattle will graze Spartina, but it appears to be unpalatable to modern breeds of Dutch and Danish stock. Attempts have been made to harvest it for use as silage, but this is difficult on soft marshland terrain intersected by tidal creeks; the silage has a protein content roughly equivalent to that of medium quality hay (Hubbard and Ranwell, 1966). It has also been used for thatching, mulching, and the manufacture of poor quality paper.

Some disadvantages

Unfortunately, there are also disadvantages in the establishment of *S. townsendii* (*s.l.*) on muddy intertidal sites. If ecological conditions are suitable, this plant can completely change the physiography and ecology of a tidal estuary, and rapid expansion of the tussocks to form an extensive sward can obliterate some of the smaller tidal channels used by yachtsmen and fishermen. The larger channels tend to become deeper, as well as narrower, as the result of Spartina encroachment. Botanically, a Spartina sward is dull because there are so few associated species. Locally, uniform spreads of *S. townsendii* (*s.l.*) have invaded and displaced pre-existing salt marshes, blanketing their interesting variety and zonations. This is happening at Blakeney Point, on the Norfolk coast, and nearby, at Scolt Head Island, vigorous invasion by this species has overrun sandy mudflats where Brent Geese and other wildfowl formerly grazed on *Zostera* and *Enteromorpha*, and associated organisms which are not found in the *Spartina* sward. Near Weston-super-Mare a beach resort has lost much of its recreational value following extensive development of Spartina across its foreshore. In face of these difficulties, many people concerned with boating, fishing, wildfowling, birdwatching and natural history have come to regard spreading Spartina as a pest and a nuisance. Carefully-timed spraying with herbicides from a helicopter can eradicate it, but this is a costly procedure and it leaves behind a derelict waste of dead, muddy vegetation.

Another unwelcome feature in southern England has been the onset of patchy degeneration, known as die-back, in previously healthy Spartina marshland, resulting in the release of sediment, some of which has been washed into navigation channels

that now require more frequent dredging. The reasons of die-back are not fully understood; it is a feature of clay-rich muddy sites, rather than silty or sandy substrates, and it calls in question the long-term benefit of introducing Spartina to muddy estuaries.

These various disadvantages should induce caution in any attempt to introduce *S. townsendii* (*s.l.*) to areas where it is not already established. Introductions should be preceded by physiographic and ecological surveys designed to estimate the possible extent of change, and by conservation studies to decide on the possible consequences in terms of local land use, fishing, recreational use, scenic values, and scientific interest. Individuals should also seek the approval of the relevant authorities, such as the Department of Agriculture, the Lands Department, the Department of Fisheries and Wildlife, the Soil Conservation Authority, the Public Works Department, and the National Parks Authority in Victoria, before introducing *S. townsendii* (*s.l.*). Introduction of this plant could result in legal action by parties who consider their interests to have been adversely affected.

Present position in Victoria

Various attempts have been made to introduce Spartina to estuaries and lagoons on the Victorian coast (Fig. 3) during the past forty years, but so far it has not become widely established, even in sites which appear to be ecologically suitable for its rapid spread. It is difficult to find accurate information on the sources of introduced Spartina and the dates and locations of planting, and we have been unable to confirm any reports of introductions made before 1930. In that year, cuttings and seedlings of material presumed to be *Spartina townsendii* were taken from Poole Harbour and exported to Geelong (D. S. Ranwell, *in litt.*, 1965). Two batches of this were received and planted under the direction of the Geelong Harbour Trust at sites in the Barwon estuary, on the shores of Lake Connewarre, and around Corio Bay (W. J. Morrow, *in litt.*, 1967, and G.H.T. Annual Reports, 1930, 1931). One of the sites was the Log Pond, a tidally flooded excavation off Corio Bay which has since been reclaimed. The plantings in the Barwon estuary and Lake Connewarre spread very little because of severe rabbit grazing in the early nineteen-thirties (R. R. Phillips, *in litt.*, 1959) and in 1967

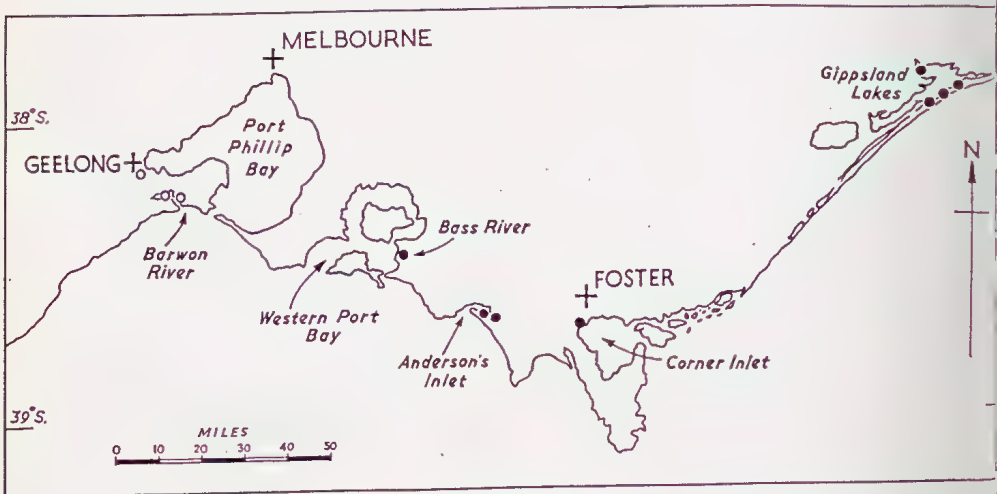


Fig. 3

we were unable to find any trace of them. The plantings in Corio Bay have also disappeared. There are records, however, of the dispersal of Spartina material received in Geelong to other estuaries (not specified) in Victoria in 1930.

Spartina occurs in the Gippsland Lakes region near Purran Corner on the Boole Boole peninsula, on Waddy Island north of Ocean Grange, and in Balfour Swamp on Sperm Whale Head. Local naturalists informed us that it has been growing in these three localities for at least 35 years, and it may well have been transplanted from Geelong. None of the Spartina patches is extensive, and their spread appears to have been purely vegetative. They have been grazed heavily by rabbits, wallabies, and kangaroos, and they occupy saline swamp sites which are not subject to regular tidal inundation. Occasionally the sites are submerged by lake floods, but in the summer months they are often dry for long periods. These are not conditions which would favour a rapid spread of Spartina, but there is also some doubt as to whether the material planted here was in fact the vigorous form of *S. townsendii*. Hubbard (1965) reported that both the sterile ($2n = 62$) and fertile ($2n = 120$, etc.) forms of *S. townsendii* (*s.l.*) occur in Arne Bay, the site within Poole Harbour from which it is presumed *S. townsendii* was cut for export. This raises the possibility that the material received in Geelong, and afterwards possibly transplanted to the Gippsland Lakes sites was in fact the sterile form of *S. townsendii* (*s.l.*), which spreads only vegetatively.

Spartina is also growing on tidal mudbanks in Poor Fellow Me Creek, south of Foster, and close to the shores of Corner Inlet. Again, we were unable to confirm its source, or the date of planting, but it was thought locally to have come from Geelong about 30 years ago. This is the kind of site that formed the nucleus of many extensive *S. townsendii* marshes in Britain: Corner Inlet is much like Poole Harbour in physiography and sedimentological characteristics, except that its sandy shoals are more extensive. Spartina was planted in the creek at about high tide level, above the mangrove (*Avicennia marina*) swamps, and it has expanded slowly during the past ten years. In August 1967 several isolated tussocks of Spartina were observed at the mouth of Poor Fellow Me Creek, below the lower limit of mangroves, and a few plants had colonized the *Zostera*-carpeted tidal shoals farther out. Where it is accessible to cattle along the sides of adjacent reclamation banks, Spartina has been strongly grazed. It is evidently not capable of establishing within the mangrove swamp, but its appearance at the mouth of the creek could be a prelude to spread in the western part of Corner Inlet. Willis (1962) recorded this material as *Spartina maritima*, the British parent of *S. townsendii*, and it is certainly less vigorous than *S. townsendii* in similar ecological situations in Britain. The possibility that it is one of the less aggressive forms of *S. townsendii* (*s.l.*) needs checking by a cytological investigation.

The situation has been complicated in recent years by the introduction of undoubtedly vigorous *S. townsendii*, obtained from the Tamar estuary in Tasmania. After earlier unsuccessful attempts, *S. townsendii* (*s.l.*) was established in the Tamar estuary by the Tasmanian Department of Agriculture in 1947, using material from a South Australian site which came originally from southern England (D. S. Ranwell, *in litt.*, 1962). This freely-seeding form shows the vigour characteristic of the fertile hybrids, and has

spread rapidly to build a depositional marshland terrace alongside the Tamar estuary near Windermere. Material from here has been planted in the estuary of Bass River, close to Western Port Bay, where it has spread in spite of grazing, and this in turn was the source of Spartina introduced to Anderson's Inlet, where it has spread rapidly during the past three years (Figure 4).

The Anderson's Inlet plantings were made near Nolan's Bluff, and in Screw Creek and a number of other sites along the northern shore, during the early nineteen-sixties. A zone of *S. townsendii* (*s.l.*) has developed on soft mud close to Nolan's Bluff, where the Tarwin River opens into Anderson's Inlet (Figure 2), and numerous tussocks have appeared on sandy mudflats in a 200-acre region east of the mangrove islands near the southern shore of the estuary, about 2 miles north-west of Nolan's Bluff (Figure 5). These have colonized naturally by seed or seedling dispersal from the original plantings. The site was previously occupied only by a sparse *Zostera* cover, passing into an open salt marsh community (mainly *Juncus maritimus, Samolus repens, Salicornia australis, Suaeda maritima,* and *Limonium thouni*) in front of the *Avicennia marina* swamp. The site has an appearance (Figure 5) similar to that recorded in early photographs of Spartina invasion in Poole Harbour; it is not grazed by stock, rabbits, or marsupials, and it could well become the first area in Victoria to develop an extensive *S. townsendii* (*s.l.*) sward. Even where it is subject to grazing, on parts of the northern shore (Figure 6), the plant is spreading steadily year by year.

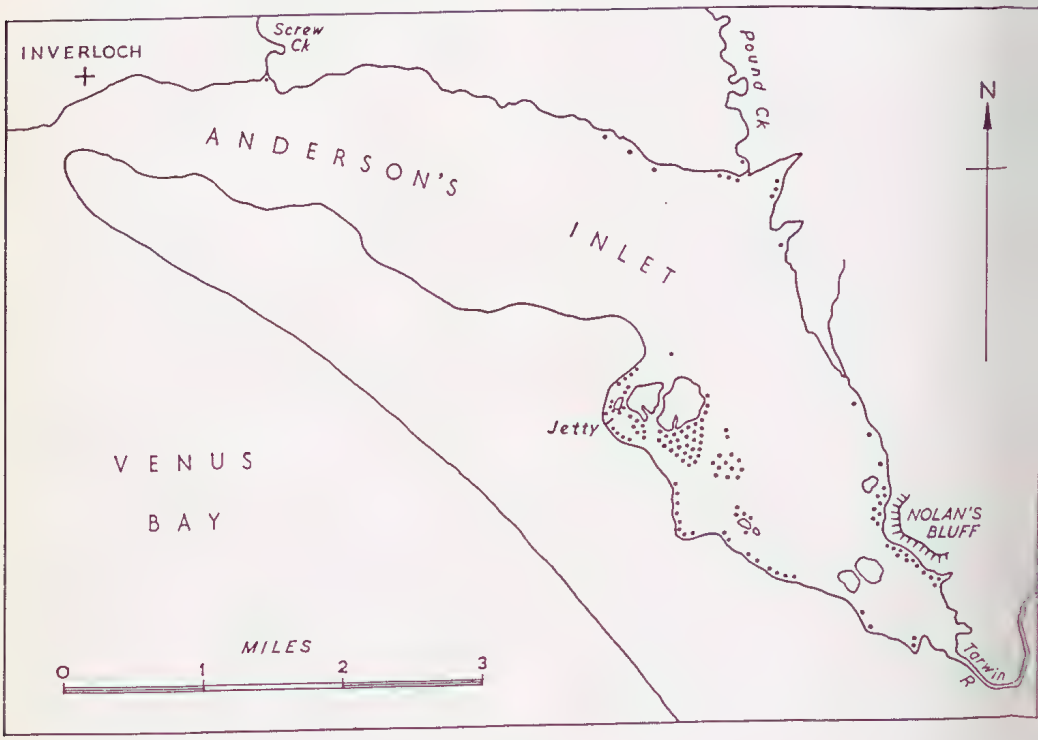


Fig. 4

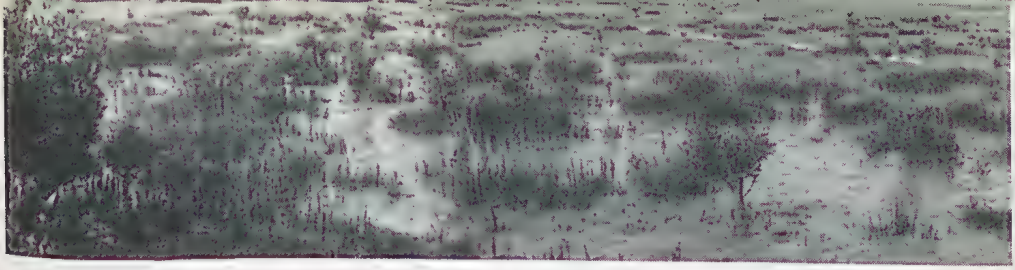


Fig. 5

Many of the tussocks in Anderson's Inlet show sparser central growth within rings of more vigorous Spartina that flowered and seeded in 1967 (Figure 7). This is evidently a typical feature of the early stages of development of Spartina colonies growing without competition from other plants (Caldwell, 1957). The centres die back as the tussock extends peripherally, then secondary rhizomes invade the bare area and produce new growth. One of us (K.G.B.) is making a detailed study of the physiography and ecology of Anderson's Inlet as a basis for a long-term study of Spartina development here.

Fertile *S. townsendii* (*s.l.*) was one of the species planted by the Soil Conservation Authority on the eroding banks of the Mitchell River delta and at other points on the shores of the Gippsland Lakes during the early nineteen-sixties. It has spread slowly on sheltered sectors of the shoreline, but is unlikely to become extensive in this almost tideless environment. It is hoped that Spartina will develop here sufficiently to halt shoreline erosion, by forming a protective swamp fringe to replace the lost *Phragmites* reedswamp (Bird, 1962).

Ranwell (1967) emphasized the need to enlist the aid of field naturalists in observing and recording the introduction, distribution, and extent of Spartina. We shall be very glad to hear of any other localities in Victoria where Spartina is growing, or where it is known to have been introduced in the past.

Fig. 6

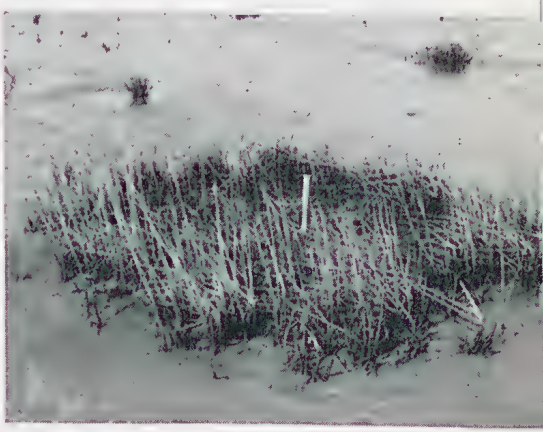


Fig. 7

References

Bird, E. C. F., 1962. The river deltas of the Gippsland Lakes. *Proc. Roy. Soc. Vict.*, **75**: 65-74.

Caldwell, P. A., 1957. Spatial development of *Spartina* colonies growing without competition. *Ann. Botany*, **21**: 203-14.

Hubbard, J. C. E., 1965. *Spartina* marshes in southern England, VI: Pattern of invasion in Poole Harbour. *J. Ecol.*, **53**: 799-813.

————, and Ranwell, D. S., 1966. Cropping *Spartina* salt marsh for silage. *J. Brit. Grassland Soc.*, **21**: 214-7.

Lambert, J. M., 1964. The *Spartina* story. *Nature*, **204**: 1136-8.

Marchant, C., 1963. Corrected chromosome numbers for *Spartina* x *townsendii* and its parent species. *Nature*, **199**: 929.

Ranwell, D. S., 1961. The effects of sheep grazing at the upper limits of *Spartina* marsh in Bridgwater Bay. *J. Ecol.*, **49**: 325-40.

————, 1967. World resources of *Spartina townsendii* (*sensu lato*). *J. Applied Ecol.*, **4**: 239-56.

————, Bird, E. C. F., Hubbard, J. C. E., and Stebbings, R. E., 1964. *Spartina* marshes in southern England, V: Tidal submergence and chlorinity in Poole Harbour. *J. Ecol.*, **52**: 627-41.

Willis, J. H., 1962. *A Handbook to Plants in Victoria*, I: 165.

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The Holtermann Nugget

By T. F. Zirkler

Hill End, near Bathurst, New South Wales, was a bustling mining town during the late 1860's and early 1870's; with shops, restaurants and hotels catering for the wants of the miners. Good gold was being won and money circulated freely. Many gold diggers of our early colonial days were rough and unpolished; but not so Bernard Holtermann of Hill End. However, he was not really a miner. Holtermann was the purveyor of Holtermann's Life Preserving Drops which were sold around the gold diggings, and no doubt, the German did a good trade. He is not remembered however for his pills (which he claimed would cure tuberculosis, gout, and bruises among other things).

He was a partner with Louis Beyers, a fellow German, in a gold mine, and it was from this mine on October 19th, 1872, that Beyers dug the nugget known now as Holtermann's nugget—a huge nugget, seven feet high, two feet wide and four inches thick.

Holtermann was lucky. He had sold his share in the mine but managed to buy it back before the strike became known. One story is that it was because of a premonition before the strike was made.

A large piece, weighing over two hundred pounds, broke off the nugget while getting it to the surface, but that was of little consequence. The remaining nugget weighed six hundred and thirty pounds, valued at that time at £12,000. Today's value would be something like $100,000, thus eclipsing by far the "Welcome Stranger" in size and value.*

Bernard Holtermann, standing alongside the nugget mined from a quartz reef.
(Note—This photograph was taken after portion of the nugget had broken off.)
Picture from the Mitchell Library, Sydney; by courtesy of Miss V. Tongs, Finley, N.S.W.

* Comparison of the weight and the price of gold at the time leads us to conclude that the nugget was, by no means, pure gold, but must have contained a large amount of quartz.

Holtermann apparently continued his business of medicine, and his affluence may be measured by his appearance when photographed with the nugget. There is now one remaining hotel in Hill End, a town which once supported over fifty.

There is no story of mateship like that of Deason and Oates of the "Welcome Stranger". Holtermann always referred to the nugget as *his* nugget, and it has become known as such. Beyers, the man who actually dug the nugget, spent his share or gave it away and ended his days a poor man.

An interesting point to remember is that while the "Welcome Stranger" (see *Victorian Naturalist*, June 1967) was an alluvial nugget found on, or near the surface, the Holtermann nugget was a quartz nugget mined from a reef.

Photoflora '68

Nature photographers are invited to participate in Photoflora '68, the fifth photographic competition and exhibition organized by the Native Plant Preservation Society of Victoria.

Entries of 35 mm. colour transparencies are invited in the following sections:

A. Victorian wildflowers, excluding orchids.
B. Victorian orchids.
C. "In the bush with a camera."
D. Australian wildflowers not normally found in Victoria.

Trophies will be awarded in each section.

Entries close on 5th February, 1968, and entry forms with full particulars are obtainable from the Competition Secretary, Miss B. C. Terrell, 24 Seymour Avenue, Armadale, 3143.

Public screenings of accepted slides will be held in March and April, 1968, at Albury, Bairnsdale, Bendigo, Boort, Geelong, Hamilton, Launceston, Mansfield, Melbourne, Mildura, Mornington, Morwell, Ringwood, Shepparton and Warrnambool.

Mammal Survey Group

Mammals of the Metropolitan Area

In addition to the surveys being undertaken further afield, the Mammal Survey Group is commencing a survey of the mammals of the Metropolitan area. This will be based largely on locality records for mammals in the Melbourne suburbs, with attention being directed initially at the two possums common in Melbourne, the ringtail *Pseudocheirus lanuginosus* and the brushtail *Trichosurus vulpecula*

The group therefore requests all F.N.C.V. members to help. Reports of sighting of either of these possums (or any other non-domestic mammal) would be greatly appreciated in expanding our records. All data will be plotted on a map of the Melbourne area. Specific details of localities are needed, so that they can be pin-pointed in a street directory, with details of date, time of day and surroundings.

Information should be sent to the Hon. Secretary, Mammal Survey Group, 39 Huntingtower Road, Armadale 3143.

Field Naturalists Club of Victoria

The following is a report of the address given by Mr. Hodgson to members at the November General Meeting, together with General Business and Exhibits.

The subject for the evening was "The Role of Fire in the Ecology of the Eucalypt" by Mr. Athol Hodgson.

Mr. J. Quirk introduced the speaker explaining that the reason for the talk was that Mr. Hodgson had approached him in connection with forestry practice of low intensity burning in forest areas. Because of criticism by the press and some clubs, he asked Mr. Quirk if he could get a group to listen to the Forest Commission's views on the subject of burning. Mr. Quirk admitted he would take a lot of convincing but arranged for Mr. Hodgson to address the F.N.C.V.

Mr. Hodgson said that an understanding of fire effect is fundamental as some people believe that the Forest Commission's policy and use of fire is detrimental. The Commission is responsible for conserving and protecting timber, flora, wild life, and water conservation.

Unfortunately too little is known of research work being done on the effect of fire. Fire has been part of the Eucalypt environment for thousands of years.

He referred to Dr. Alan King's book on *The Influence of Colonization on Forests*, concluding that colonization has—

1. brought change in forests;
2. reduced the area of forest burnt annually;
3. produced more damaging fires.

He showed pictures of Eucalypts and mentioned some physiological features—

1. the ability of the trees to put out epicormic shoots from dormant buds on the trunk, which are inactive until the crown is destroyed;
2. the presence of ligno-tubers, being a mass of dormant buds and food material near the root capable of producing new growth;
3. many forms have thick resistant bark—exceptions include Mountain Ash.

In parenthesis he said that Mountain Ash without fire would disappear in time. The climate and forest fuels drying annually caused danger. Lightning set off one-third of the fires.

The fire problem is due to litter fuel from leaves, bark, and twigs on the ground, representing stored energy which, when released quickly by fire, is bad, but if of low intensity there is not much damage.

The litter fuel builds up for years and in Europe and North America a balance between fall and decay is reached in a few years, but in Eucalypt forests the litter builds up, maybe for 40 years, without being balanced by decay. He illustrated this difference by graphs from research results. Except in Mountain Ash forests, there is very little decay making soil under the litter in Eucalypt forests, in contrast to the decomposition and benefit to the soil in overseas forests. This is responsible for more damage when fire does come. Eucalypt forests have unique fire behaviour. Strips of bark and leaves when fired intensely can be uncontrollable as they are carried up in convection columns and can be carried in a wind ahead of a fire, causing hundreds of spot fires to start many miles ahead—18 miles in 1965. This is unknown in the rest of the world. Such fires with heavy fuel (accumulated litter), dry weather, and ignition source cannot be stopped in full flight. Control burning when there is only light fuel such as 3 tons to the acre instead of 10 tons to the acre, prevents intense, uncontrolable fires by giving low intensity burning. The control burning is done when conditions are damp enough not to burn out. This fire does not reach the tree tops. *Eucalyptus delegatenses* will stand this. He showed graphs and results of work done by Melbourne University on temperatures experienced at soil surface in unburned, lightly burned, burned bare

and severely burned areas, showing that fire destroys soil only by severe burning, and that pore space is actually improved by light burning. He showed aerial pictures of hills in Gippsland after a big fire, with one part previously fire controlled by low intensity burning, contrasting with devastated areas not previously so controlled, and the former suffering very little damage.

The practice of low intensity burning is now common in Victoria, Western Australia and Southern N.S.W. Research on timber quality in forests treated with low intensity burning shows scorching to 15 ft. and evidence cannot detect difference in growth rates of trees in those and untreated areas. Some evidence in Western Australia affirms it increases growth which may be due to the fire setting free essential minerals into the soil. After a big fire in Daylesford, there was loss of growth rate. Epicormic growths degrade timber.

Experiments are being done on the run off of water due to controlled burning. Some indicate that the solid matter in water off burnt areas is detrimental but it isn't yet proved, and it is still being studied by the Forest Commission in a giant project with the Conservation Authority and State Rivers.

The effect of fire on living animals is being investigated by Monash University. Mr. Hodgson said that the Lyre bird habitat in Sherbrooke has deteriorated because of wire grass increase which prevents the birds from scratching, and the population has decreased. He claimed that the magnificent Wilson's Promontory is as it is because of former fires. He showed pictures of areas rich in pink heath and other native plants after burning and gave results of surveys on orchid occurrence proving they are not destroyed by fire. Acacias increase after the fire cracks the seed coats.

In Karri forests in W. Australia, where acacias came thickly after one fire, 3 or 4 low intensity burnings have cleared these away allowing for better conditions for the growth of the desired Karri trees.

The effect of fire on habitats for the larger animals is believed by the commission to be beneficial if only a part of the area is burnt at a time. Mr. Hodgson pointed out that Leadbeater's Possum recently was discovered in two Mountain Ash areas, and that Mountain Ash only regenerates naturally in an ashy seed bed. Otherwise it dies out in time, so fire is important, although it must not occur frequently or before trees are mature and seeding, or "harvested" for timber.

The effect of burning on small mammals, birds, reptiles, and insects, is not yet understood and their fate causes concern.

In Kings Park repeated light burning is not detrimental to insects. He suggested the possibility of planned burning for parts of the Grampians. Thryptomene benefits from burning. Considerations for the Forest Commission are—

1. When is it desirable to **exclude** fires? (Mountain Ash needs fire only to begin it and then not again until trees are harvested).
2. When **must** it be used? (Many forest assets require fire of the right heat).
3. Most Eucalypt land requires **some** fire.

Mr. Allen thanked Mr. Hodgson and said that members had been given much to think about. Many questions were asked about the fate of echidnas and about the dangers in "control" fires getting out of hand, which has happened.

Mrs. Woollard put forward the view that the loss of the Ground Mother Shield fern in Sherbrooke was due to tramping over it, and spoiling the habitat for lyrebirds.

Mr. A. J. Swaby spoke of a trip to the Western district recently, and his meeting with members of combined western Naturalists Clubs, who are planning surveys and intense study of the flora. He suggested the benefits of co-operation of city members with country members in such projects. He mentioned that he had seen in an artist's studio in Hamilton a stained glass window in honour of Arthur Webb, to be unveiled in the church at Kalorama on the first Sunday in December.

Mr. J. Baines told of excursions he had taken from Adelaide recently with South Australian Field Naturalists. He suggested that the Grampians should be reserved as a National Park.

Exhibits

Mr. R. Condron showed: 1. Hairstreak butterflies (*Pseudalmenus chlorinda zephyrus*) and pupal cases from Buxton. Ants attend the larvae; 2. common pea blue butterflies (*Lampides boeticus*).

Mr. J. R. Garnet—A spray of *Choretrum lateriflorum* in flower from Mallacoota.
Mr. J. Baines—A fasciated stem.
Miss Jenny Forse—Insects embedded in plastic pendants.

Nine new members, whose names appear in the November *Naturalist*, were elected.

Botany Group—November

The meeting was attended by sixteen members and Mr. B. Fuhrer took the chair. The guest speaker, Dr. Suzanne Duigan, of the Botany School, Melbourne University, who had been asked to speak on "Sedges and Rushes", found it advisable to extend her talk to include the grasses; and set out the detailed differences between the five families of Gramineae (grasses), Cyperaceae (sedges), Juncaceae (rushes), Restionaceae (cord-rushes, scale-rushes and rope-rushes) and Centrolepidaceae, with passing reference to Typhaceae (bulrushes). With skilful use of the blackboard she made clear in turn the differences in stems, leaves, sheaths, flower arrangements, sex, perianths, stamens, ovaries, placentation and fruits. Many members copied the essential data for use as a key to identification on a family basis, and afterwards studied the many pressed specimens on display.

Dr. Duigan was cordially thanked by Mr. Fuhrer for her most instructive talk.

Because of transport difficulties the proposed excursion to French Island was postponed, but arrangements were made for Mr. Tom Sault to lead an excursion to various parts of the Mornington Peninsula. This excursion was held on Sunday, November 12, and those who attended were pleased to be shown areas where interesting species were growing in profusion. These included the railway line near the now-removed Langwarrin station, where Patersonias and Purple Diuris (*D. punctata*) were flowering prolifically among spikes of *Xanthorrhoea minor*, and two Western Australian introductions, *Acacia saligna* (Golden Wreath Wattle) and *Oxylobium lanceolatum* (Shaggy-pea). In a burnt area near Arthur's Seat was a great number of young specimens of the serrated-leaf form of *Banksia integrifolia*, provoking discussion of the variability of this genus (*B. marginata* was also seen, and *B. serrata* is not far away). A variety of liliaceous species were in flower at most of the spots botanized, and the last call was at King's Falls, behind Rosebud.

October—The meeting was addressed by Dr. D. Ashton, also of the Botany School of Melbourne University, on "The Flora of Wilson's Promontory", magnificently illustrated by a fine series of colour slides of the various types of habitat in this great national park, and close-ups of many of the notable species of plants. The diverse conditions of the area ranged from shoreline, wet humid gullies, swamps, heathlands to mountain tops, and a variety of flora conditions and a generally maritime climate. Thus the park supported a greatly diversified flora, including algae, mosses, fungi, mangroves along parts of the shore, heath, teatree, she-oaks, lilly-pilly and forests of eucalypts. The effects of fires were noted, with photographs and commentary, and it was good to hear of the survival of the rain-forest area (with lilly-pilly and numerous ferns, etc.) at Chinaman's Creek and the gradual regeneration at Lilly-pilly Gully.

Questions were answered, and mention was made of the fact that a new species of daisy-bush, *Olearia allenderi*, has been named by Mr. Willis after one of our members, its discoverer.

Geology Report 1st November

29 members and visitors attended with Mr. Dodds in the Chair. Mr. Wigmore reported on the October excursion to Yallourn which was well attended and very instructive.

Subject for the evening—"Members' Night". Some of the contributions were, Mr. Nielson, slides of mining operations at Gove Peninsula (Bauxite), Groote Island (Manganese) and McArthur River (Silver-Lead-Zinc Ore). Mr. Dodds spoke of recent mapping of the floor of the Indian Ocean, which shows huge ridges and rift valleys in its contours. Mr. McInnes spoke of the Tertiary deposits in the south-eastern suburbs which he visited, and Mr. Hammond spoke on the Crystalline structure of minerals, explaining the planes of symmetry and crystal axes of the various systems.

EXHIBITS:

Mr. Dodds—Bauxite in the form of Gibbsite and Boehmite; Boolara, Vic. Sedimentary rocks; Kendall's Quarry, Murray Gulf, Quambatook.

Mr. Blairstowe—Diotomite; Nairobi (from the only Diatomite mine in Africa). Red Porphyry; (occurs in a

dyke 80 ft. thick near the Red Sea. Some used in the Vatican). Wulfernite; Yugoslavia.

Mr. Francis—Fossil Fish (Lower Cretacous); Koonwarra, Vic.

Mr. Sault—Sections of Basalt; Narre Warren, Mornington, and Flinders, shown under microscope.

Marine Biology and Entomology Group, November, 1967

Mr. R. Condron chaired the Meeting, which was attended by 20 members.

Arrangements were confirmed for the F.N.C.V. outing to Flinders which is to take place on Sunday December 10, the leader being Mr. R. Jens, who will meet us at Flinders, which is, said Mr. Jens, a good locality for the collection of Polychaete worms.

Mr. R. Jens, Lecturer in Science, Coburg Teachers' College, was our Guest Speaker for the evening, his subject being Polychaete worms. Mr. Jens gave an excellent and most comprehensive talk on the various species of Polychaete worms, giving details of their anatomy. He also made good use of the blackboard and projected many slides for us. At the conclusion of his talk, Mr. Jens answered many questions, and a vote of thanks was moved by Mr. D. McInnes.

EXHIBITS:

Mr. McInnes showed under his microscope, a species of freshwater Hydra.

Mr. Condron showed a case of Victorian butterflies including some Hair-streaks which he had caught at Buxton.

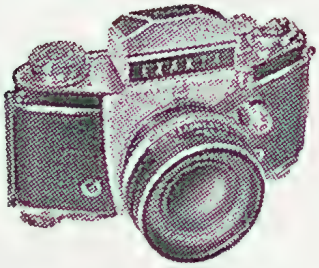
Dr. Brian Smith, Curator of Invertebrates National Museum, displayed several species of Polychaete worms which he had very kindly brought along as an aid to Mr. Jens' talk.

Report of General Meeting 12 December

Before the commencement of the monthly general meeting, an extraordinary meeting was called to decide the outcome of the application for affiliation of the Traralgon F.N.C. The decision to affiliate this club was unanimous.

Approximately 120 people were present when the President, Mr. E. R. Allan, opened the general meeting.

The minutes of the November general



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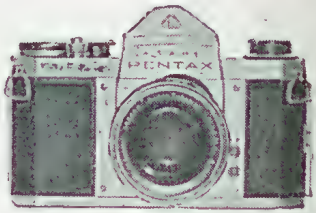

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meeting having been previously examined by Council, were taken as read, and confirmed.

The announcement of the award of the Natural History Medallion for 1967 having been made to Gilbert Whitley, who has done a great amount of work in the taxonomy of fish, was brought to the notice of the meeting.

The only correspondence received for the evening was a letter from an older member, Mr. Hemmy, who through being semi-invalid, is unable to continue his membership and attendance with the F.N.C.V. The Secretary suggested that those who were able, might visit Mr. Hemmy in hospital, the address of which may be obtained from the Secretary, Mr. D. Lee.

The Secretary also read an extract from "Time" magazine, in which an American scientist claimed that evidence was available that indicated that concentrated hunting and killing was the reason for the extinction of the Sabre-tooth Tiger and other contemporary prehistoric animals of North America, rather than any dramatic cooling of climatic conditions.

The guest speaker for the evening, Mr. Lance Edgar, who is Assistant Director of the Natural Resources and Conservation League, was introduced by the President, and began by stating that the League was unknown to many, even though 23 years have gone by since its foundation.

He gave a brief history of its formation and beginning, when after the 1939 bushfires, Mr. Cyril Isaac senior was concerned about the frightful devastation of forest areas, and so set up a nursery at Noble Park to help provide for replanting of some areas.

As a school teacher, he had a great deal of success in growing a variety of trees in poor soils, which hitherto had been thought quite unsuitable for the purpose; and through this success, he acquired the backing of the education department and was instrumental in establishing the Hughesdale State School Nursery.

After these successes, he resigned from the education department, and concentrated on his nursery and a political career.

Soon after, in 1944, after realizing the importance of forests in regard to soil, water, and wildlife conservation, Mr. Isaac prompted the formation of the Save the Forests Campaign, which currently is the N.R.C.L.

This venture started with the obtaining of trees from the Forests Commission, but now, the League has its own nurseries where last year half a million seedlings were grown and dispatched.

However, the nursery is only part of the true function of the League, which has two general meetings per year, and is controlled by an executive selected at one of these meetings. Representatives from the Forests Commission, the F. and W. Dept., S.C.A., C.R.B., and Agricultural Department are on the executive. Throughout the state there are 13 regions from where representatives of Local Government are drawn.

The League has a part-time director, Mr. Geo. Thompson; an Assistant Director, Mr. Lance Edgar; and a full-time Nursery Supervisor.

Information from the N.R.C.L. is disseminated through three channels—

1. A journal, 7000 of which are published each quarter.

2. Annual two-day conventions held in one of the 13 regions, and at which on the first day, authoritative speakers attend, to be followed on the second day by a field trip relating to aspects of the previous day.

3. The C. E. Isaac Educational Centre, where meetings, lectures, and short courses for Local Council Parks and Garden Superintendents are held each year.

Membership of the League is open only to groups, but individuals may obtain benefits through being a farmer, an associate, or a subscriber.

Mr. Edgar described the manner in which seedlings are grown in two sizes of veneer tube. This method has the advantage of producing a small seedling with well developed root system, and are easily transported.

A number of slides were then shown which illustrated the degree of success that the League has had in re-establishing areas with trees that had been eroded and cleared in past years.

Projects have also been undertaken in which the S.C.A. has joined with the N.R.C.L.

The Junior Tree Lovers' League, to which schoolchildren may belong for a subscription of 10c, whereupon they receive a small tree and a certificate, is also sponsored by the N.R.C.L.

In closing, Mr. Edgar emphasized the fact that the League really exists for the cause of conservation; and that at a more opportune time with regard to

weather, he would arrange for sufficient trees to be delivered, so that each member at a future general meeting may have one each.

The members applauded after the President had thanked Mr. Edgar for a most informative address.

The answers to questions proved that root-loosening on planting of seedlings in veneer tubes is not necessary; and that farmers are informed that certain trees should be planted to attract native birds.

Under General Business, it was announced that Mr. Jeffs had been elected Vice-president; and that copies of the recent report on pesticides were available at $1.00.

The meeting was asked for suggestions for speakers in the coming year.

In Nature Notes and Exhibits, Mr. McInnes showed some large specimens of Water-flea taken at Albert Park, and also gave a report of the sighting of a tortoise in the lake.

Mrs. Woolard spoke of the article regarding the scarcity of Gouldian Finches which Graham Pizzey reported recently.

Mr. Baines commented on the recent report of possible mining of part of the coral reef in the Great Barrier Reef, and also of another report of possible oil and gas interests in the same area. He also spoke of an article in the South Australian Naturalist, which gives an account of the types of flora depicted on the $5.00 note.

Mr. W. Genery kindly brought a selection of slides of the Fairy Shrimp and Lepidurus for interested members. (A paper on the latter is to be published in the *Vict. Nat.* for next March.)

The other exhibits included a number of excellent publications from the Hawthorn Juniors; a specimen of each of *Marianthus erubescens,* Red Kangaroo Paw (*Anigozanthis rufa*), and the Hairy Fan-flower (*Scaevola aemula*).

The new members whose names appear in the current *Naturalist* were elected.

Geology Report, 6th December

37 members and visitors attended with Mr. Dodds in the Chair. The main business of the evening was the election of Office-bearers for 1968. Mr. Dodds, the retiring chairman did not seek re-election and Mr. R. Davidson agreed to accept that position. Joint Secretary Mr. Box withdrew from that position. The other Joint Secretary, Mr. Sault agreed to continue as secretary. Mr. Box spoke in praise of the service given by Mr. Dodds over the years and thanked him on behalf of the Group.

Subject for the Evening, Book Night.

Many fine books and publications on the various aspects of Geology were displayed, particularly those from Mr. Dodds own Library, many of which are now collectors' items. Mr. Dodds spoke of these and the authors who pioneered the Geological Surveys of Australia. The evening concluded with a most enjoyable supper supplied by the ladies.

EXHIBITS:

Mr. Blairstowe—Aragonite, Turkey, Limestone (variety called Leopard Stone), India. Fluospar; Rajastham, India; Pumice from the rim of Mt. Etna.

Mr. McInnis—Rock sections from various locations shown under microscope.

Mr. Davidson—Pyrite crystal, cut and polished, Mt. Martha.

Mr. Dangerfield—Pegmatite, N.E. Victoria.

F.N.C.V. DIARY OF COMING EVENTS

GENERAL MEETING

Monday, 8 January—At National Herbarium, The Domain, South Yarra, commencing at 8 p.m.

1. Minutes, Reports, Announcements.
2. Correspondence.
3. Subject for the evening—Members' Night.
4. General Business.
5. Nature Notes and Exhibits.

(Note—Due to there being no Council Meeting in December, new members' names for January will appear in the *Vict. Nat.* for February.)

GROUP MEETINGS

(8 p.m. at National Herbarium unless otherwise stated)

Wednesday, 17 January—Microscopical Group.

Monday, 22 January—Entomology and Marine Biology Group. This group meets in Mr. Strong's rooms in Parliament House; enter through private gate at south end of building.

Wednesday, 7 February—Geology Group.

Thursday, 8 February—Botany Group. Members night.

F.N.C.V. EXCURSIONS

Sunday, 21 January—Mt. Martha. The coach will leave Batman Avenue at 9.30 a.m. Fare $1.50. Bookings with excursion secretary. Bring two meals.

Easter—There will be an excursion to Bright; details next month.
All cheques for excursions should be made out to "Excursion Trust".

Field Naturalists Club of Victoria

Established 1880

OBJECTS: To stimulate interest in natural history and to preserve and protect Australian fauna and flora.

Patron: His Excellency Major-General Sir Rohan Delacombe, K.B.E., C.B., D.S.O.

Key Office-Bearers, 1967

Acting President:
Mr. E. R. Allan

Vice-Presidents: Mr. A. J. H. Fairhall, Mr. T. Sault

Immediate Past President: Mr. W. L. Williams

Hon. Secretary: Mr. D. Lee, 15 Springvale Road, Springvale (546 7724).

Hon. Treasurer: Mr. D. E. McInnes, 129 Waverley Road, East Malvern, 3145 (211 2427)

Hon. Editor: Mr. G. M. Ward, 54 St. James Road, Heidelberg, 3084.

Hon. Librarian: Mr. P. Kelly, c/o National Herbarium, The Domain, South Yarra, 3141.

Hon. Excursion Secretary: Miss M. Allender, 19 Hawthorn Avenue, Caulfield 3161.

Hon. Sales Officer: Mr. E. R. Allan, c/o National Herbarium, The Domain, South Yarra, 3141.

Group Secretaries:

Botany: Mr. K. Kleinecke, 8 Oliver Street, Ashburton 3147 (25 2415).

Geology: Mr. T. Sault.

Microscopical: Mr. M. H. Meyer, 36 Milroy Street, East Brighton (96 3268).

Mammal Survey: Mrs. R. Frankenberg, 39 Huntingtower Road, Armadale 3143.

Entomology and Marine Biology: Mr. J. W. H. Strong, Legislative Council, Parliament House, Melbourne, 3002.

MEMBERSHIP

Membership of the F.N.C.V. is open to any person interested in natural history. The *Victorian Naturalist* is distributed free to all members, the club's reference and lending library is available, and other activities are indicated in reports set out in the several preceding pages of this magazine.

New Rates of Subscriptions for 1968

Ordinary Members	$7.00
Country Members	$5.00
Joint Members	$2.00
Junior Members	$2.00
Junior Members receiving **Vict. Nat.**	$4.00
Subscribers to **Vict. Nat.**	$5.00
Affiliated Societies	$7.00
Life Membership (reducing after 20 years)	$140.00

The cost of individual copies of the **Vict. Nat.** will be 45 cents.

All subscriptions should be made payable to the Field Naturalists Club of Victoria, and posted to Mr. D. McInnes, 129 Waverly Road, East Malvern 3145.

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the VICTORIAN NATURALIST

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Registered in Australia for transmission by post as a periodical

45 cents

Photoflora '68

Competition Wildflower Photographs

Screenings of 150 award-winning and accepted colour slides of wildflowers and native plants from Victoria and other States, with a commentary on the plants.

MELBOURNE	Monday, 4th March Tuesday, 5th March Wednesday, 6th March } 8 p.m., at V.A.Y.C. Hall, Gisborne Street, East Melbourne.
LAUNCESTON	Friday, 8th March Saturday, 9th March } 8 p.m., at Little Theatre, Tamar Street.
MANSFIELD	Tuesday, 12th March, 8 p.m., at High School, View Street.
ALBURY	Wednesday, 13th March, 8 p.m., at Red Cross Hall, Dean St.
BOORT	Thursday, 14th March, 8 p.m., at High School, Malone Street.
BENDIGO	Friday, 15th March, 8 p.m., at Institute of Technology, McCrae Street.
SHEPPARTON	Saturday, 16th March, 8.15 p.m., at Civic Centre Theatrette, Welsford Street.
WANGARATTA	Sunday, 17th March, 2.45 p.m., at Lower Town Hall, Ovens St.
RINGWOOD	Tuesday, 19th March Thursday, 21st March } 8 p.m., at Lower Town Hall.
GEELONG	Wednesday, 20th March, 8 p.m., at Y.W.C.A. Hall, Aberdeen Street.
MORWELL	Friday, 22nd March, 8 p.m., at Town Hall.
BAIRNSDALE	Saturday, 23rd March, 8 p.m., at R.S.L. Hall, Forge Creek Rd.
MORNINGTON	Wednesday, 27th March, 8 p.m., at Civic Centre Hall, Queen Street.
HAMILTON	Friday, 29th March, 8 p.m., at Art Gallery Auditorium, Brown Street.
WARRNAMBOOL	Saturday, 30th March, 8 p.m., at Temperance Hall, Koroit St.
MILDURA	Saturday, 6th April, 8.15 p.m., at C.W.A. Hall, Deakin Ave.

Admission: Adults 40 cents, Children 20 cents.

The Victorian Naturalist

Editor: G. M. Ward

Vol. 85, No. 2 8 February, 1968

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This photograph of a Bearded Dragon was taken while wandering over the red soil of the area to the west of Hattah. This area is known as the "Raak" and contains quite a deal of wildlife if one cares to take time to leave the car and wander.

Vale—W. (Bill) White

When in the early part of 1967, it appeared that the possibility of appointing an assistant editor was remote, the name of a person was mentioned who would perhaps be willing to discuss the matter.

The person whom I was to contact was Bill White—and from the first moments of our telephone conversation, just over six months ago, I was impressed by his sincerity to help in any way he could towards the publishing of the *Victorian Naturalist*.

Having been connected with printing and publishing from his early days, he was completely familiar with the techniques used, and was more than willing to give of his knowledge thus gained.

On a number of occasions he mentioned to me that although he was quite able to correct and edit material, he found it impossible to produce anything original.

I could never really accept this however, for I believe he had all that was necessary for such work—logical and deliberately clear in his approach to subjects; deeply interested in matters of natural history; a regular member of excursion groups; and above all, he was humble and showed a kindly consideration towards his fellow man.

Due to the remoteness of our respective suburbs, it was a fact that Bill White and I never met—yet all these qualities were unmistakably apparent, even through such an impersonal appliance as a telephone.

During convalescence after an illness, the *Victorian Naturalist* he told me, was a constant source of pleasure to him; and I believe that to have had some part in its publication, even though for such a regrettably short time, would have certainly given him a great deal more pleasure.

To have been associated with Bill White was for me both an honour and a source of encouragement; and his untimely death leaves a vacancy which will be most difficult to fill; and even more, loses to us a man with qualities not so commonly found among us today.

On behalf of the Council and members of the F.N.C.V., I extend to Mrs. White and her two daughters, and their families, deepest sympathy in their recent sad loss.

G. M. WARD

A Probable Native Stone Arrangement at Franklinford

By Aldo Massola*

Within months of Major Mitchell's discovery of the Loddon Valley, the country was being occupied by squatters. Mollison settled on the Coliban in January, 1838, and in April of the same year, Captain Hepburn settled at Smeaton Hill. These two pioneers were followed by others, until all the land was 'squatted' upon either by flock owners or by their agents or 'managers'. The fact that the valley was, in reality, the home of a native tribal group was not taken into account. The claims or needs of these people were dismissed as being illogical, since, at the time, aborigines were hardly regarded as being human beings; and it was generally felt that they had no more right to the land than did kangaroos.

In most cases, the newly arrived settlers, initially enlisted the help of the aborigines to find the best pastures and waterholes, and employed them in helping to erect huts and fences. Then the native game was shot down in organized hunts, because it competed with the sheep for the grass. When the aborigines became too dependent and camped close to the stations, they were ordered off the runs. This was because they expected a "hand out" as a right, since it was tribal law to share, especially as the white men mostly made free with their women.

Deprived of their food and waterholes, and of their ancestral grounds, the tribesmen were often forced by starvation to commit depredations upon the flocks and flour stocks of the settlers. This led to the shooting of some of the aborigines, sometimes followed by an attack upon, and the killing of a lonely hut-keeper in revenge. This act the colonists called murder, and they retaliated by organizing hunts, when the natives, men, women and children, were shot down indiscriminately. This, according to them, was "teaching them a lesson"; for, as one of the settlers (Henry Munro) recorded in 1840: "They (the natives) are still lurking about the creeks and seem determined to act as lords of the soil".

As an example of the usual order of events the following episode may be cited:

At the end of 1839 Captain Dugald McLachlan settled at Glengower Station, and after the usual "introductory period" during which they were given flour and sugar rations, the aborigines were gradually discouraged from frequenting the run. The culminating point of this policy was when the cook, who was in charge of the rations, either under instructions from his employer, or otherwise, distributed to the natives a mixture of flour and plaster of Paris. Though this was a better mixture than the arsenic given them elsewhere in Victoria, we can imagine the "damper" which resulted.

The natives, to whom this act was probably the last of a great many indignities, speared the cook, and helped themselves to the quarters of mutton hanging on the rafters.

* Flat 4, 18 Wolseley St., Mont Albert 3127.

McLachlan and his men caught up with the aborigines at a waterhole on Middle Creek, where they were about to feast on the mutton. The natives sought safety by diving into the waterhole and there they were shot, one at a time, as they came up for air. The place is known as the "Blood-hole" to this day.

This tragedy is illustrative of the conditions existing in the Loddon Valley at that period, conditions which would have given rise to many more such affairs, but for the timely arrival of the Assistant Protector for Aborigines, Edward Stone Parker.

The Protectorate

Alarmed at the great number of reports of atrocities perpetrated upon the native races of the British Empire by the colonists, special Committees were formed in 1837 by the House of Commons, in England, in order to find the best means of putting a stop to these injustices. As far as Port Phillip was concerned, the deliberations of the appropriate Committee recommended the creation of a Protectorate, to which Missionaries were to be attached as a complementary measure. To this end a Protector and four Assistant Protectors were appointed in January 1838, and sent to the Colony.

Port Phillip was divided for this purpose into four districts, each of which was allotted to an Assistant Protector, under the control of the Protector, who was responsible to the Superintendent of Port Phillip. The Assistant Protectors were to join the tribes in their respective districts, follow them in their seasonal movements, protect the aborigines from injustice, see that they did no harm to the squatters or their flocks, and attempt to persuade them to abandon a roving life and settle down. The aborigines were also to be given religious and civil instruction, this leading to their becoming civilized.

G. A. Robinson was appointed Chief Protector, and the Loddon District was allotted to E. S. Parker.

Early in 1840 Robinson and Parker set out from Melbourne to find the best position for an Aboriginal Station in Parker's district, and they traversed the country from the Campaspe to the Pyreenes, then across to Mt. Buninyong, and on to Mt. Macedon. Parker was then left by Robinson to make his choice of location, and to report upon the condition of the local aborigines.

Parker's choice was a site close to a large waterhole in the Loddon River, known to the natives as Neura Mong (Hide Here), now modified to Neereman. However, much to his chagrin, when he arrived to take possession, he found that the locality had been taken up by Messrs. Dutton and Darlot as an extension of Simpson's Charlotte Plains holding.

Instead of violently disputing his claim, Parker patiently laid the matter before Superintendent Latrobe, and the verdict being given in his favour, Parker once more set out to establish his station. Upon his arrival at Neura Mong on 15th November, 1840, the land was pronounced by Overseer Bazely, who had been appointed Parker's adviser on all matters relating to farming, to be entirely unsuited for agricultural purposes. However, this being the site which he had chosen, and taken almost forcibly from the local squatter, Parker determined upon it. In any case aborigines were beginning to arrive to put themselves under his protection, since most of their country had been taken up, and they had nowhere to go. Thus by the middle of December of that year, about 170 aborigines had assembled there. Consequently, during the en-

suing months, the ground was tilled, huts were constructed, and the Station generally got under way.

In the meantime Bazely, still not satisfied with the location, kept exploring the nearby country, and finally suggested that the station be removed to Mt. Franklin. This locality being also much preferred by his native charges, Parker asked Latrobe to agree to the transfer. After some opposition from the local squatters, permission was officially given, and on 1st June 1841, moving operations commenced.

The site for the new station was a short distance to the north-west of Mt. Franklin (the Lal-jham-boorp (Split-head) of the natives), between a swamp, a favourite resort of the aborigines called by them Larnebarramul (the Home of the Emu), and Jim Crow Creek, Polodyul (a contraction of Pollard-yallock, Shallow-stream).

It is not here proposed to review Parker's work, suffice it to say that he laboured assiduously to better the lot of the unfortunate aborigines, until the Protectorate was officially abolished on 31st December, 1849.

The end of the Protectorate was due to several causes, amongst which may be cited the opposition of the Government. Superintendent Latrobe was never in favour of the scheme, and did not like the idea of the Protectorate being a Government Department. He urged Governor Gipps to either change its management, or to review the whole system. Gipps, feeling that the Protectorate was a creation of the Mother Country, referred the matter to the Colonial Secretary, whose views, however, were that protection for the aborigines could only be achieved through a change in their treatment by the settlers.

The settlers, in turn, did not approve of the money spent on the aborigines, and argued that it would be better spent in bringing out migrants. They maintained that the Protectors set aside the best land for the natives' use; and they criticized the Protectors for blaming them (the squatters) for the natives' plight, who, they maintained, deserved to be shot, since they were thieving scoundrels.

Gipps, faced with this dilemma, sanctioned the continuance of the Protectorate, but reduced the amount of money to be spent on the aborigines to a minimum, which meant that the Proctectors could only look to the welfare of "the sick, the aged, and the young".

Then the Colonial Secretary urged that the Protectorate be extended in scope, and the new Governor, Sir Charles Fitzroy, placed the matter before the legislative Council, which referred it to a Select Committee. The Committee, without bothering to consult either the Protectors or the protected, and by taking evidence from squatters mostly north of the Murray, who had no knowledge of the situation in Port Phillip, recommended the termination of the Protectorate.

Thus, in July 1849, the Committee's recommendations were accepted by the Governor, who forthwith gave notice to the Protectors that their services would not be required after December 31st of that year.

However, contrary to expectations, the end of the Protectorate did not mean that the aborigines were left entirely to the mercy of the squatters. Public opinion had begun to awake to the plight of these people, and the Legislative Council could not take the recommendations of its Committee in their entirety. The Protectors were dismissed, but a Guardianship was instituted in the person of William Thomas, who was himself a former protector. A number of depots were

established throughout Port Phillip, from where essential medical and food supplies were distributed to the aborigines.

As far as the Loddon Valley is concerned, Parker was offered a license for the Reserve, now reduced to 112 acres, at a nominal rental of £60 per year. This offer he accepted, and was therefore enabled to continue to look after the welfare of his charges, the Government supplying him for the purpose with food and medicines to the value of £350 annually.

Even so, this state of affairs was not to continue for long; in 1851 gold was discovered, and this event ushered in a period of near chaos, during which the aborigines were nearly wiped out while the squatters, deserted by their men, their runs invaded by the diggers, their sheep and cattle stolen, almost faced ruin.

At this time (1851), Parker moved out of his home at the former Aboriginal Station, erecting a new one on the western foot of Mt. Franklin. Unfortunately for his farming activities, gold was found on his run in 1854, and the mining activities conducted upon it by a number of "bad characters" resulted in his losing by theft during the next ten months, no fewer than 8,000 sheep, 200 cattle and 20 horses.

About this period, or a little later, some of the miners, having become disillusioned in their search for gold, entered the employment of the hard pressed land owners, and some were put to clearing all loose stones and boulders from the paddocks. These rocks were used to erect the beautiful stone fences to be seen in this and other volcanic districts.

In the meantime the great reduction in the numbers of the aborigines necessitated a revision of the Guardianship. A Board for the Protection of Aborigines was instituted in 1860. Then, in 1864 the Mt. Franklin depot was finally closed, and the remaining handful of aborigines were transferred to Coranderrk, near Healesville.

The Present

Today, one hundred years later, to the casual observer, the Cairn erected by the Daylesford Historical Society to E. S. Parker's memory is the only indication that the aborigines ever lived in this district. This Cairn, symbolically constructed with stones and hand-made bricks from the actual site of the Station, proclaims the fact that the Loddon Aboriginal Station, Homestead, Church, and School, were established by him near this spot in 1841.

The Cairn is not the only contribution made by the Historical Society; its members, headed by Mr. Edgar Morrison, have dug deep into the dust of time, and have not only pinpointed the site of the several buildings erected by the early settlers and by the Protector, but have also reconstructed and placed in a logical sequence the happenings of those troubled times.

At the same time a vigorous, if small, band of Field Naturalists have penetrated into the lesser known spots in the valleys and on the mountains, and their discoveries in the field of natural history include stone tools and implements left behind by the natives. Some of the landowners, too, have been busy finding traces of camps and other aboriginal activities on their properties, and to these they point with ill-disguised pride.

The ethnologist is thus able to collate the several finds and to reconstruct some of the activities of the local aborigines which apparently escaped the notice of Parker. Not that Parker was unobservant: this is evident by the details of the natives' daily life which he gave in his "Lecture on the Aborigines of Australia".

In this there are many shrewd comments which, in most cases, meet the requirement of present day studies; but the aborigines were shrewd also, and knowing how he would not approve of certain aspects of their lives, these were no doubt hidden from him. After all Parker was basically a Churchman, not an anthropologist.

One of these hidden aspects was no doubt the holding of initiation ceremonies, since they are not alluded to in any of Parker's writings. He claims to have witnessed a number of corroborees, or *Yepene*, as they were called in his district, but these could never be referred to as ceremonies, being rather in the nature of pantomimes and dances staged for the amusement of all. This designation would also apply to a "singular dance or ceremony", it being a "dance of the separated spirits", which he briefly describes and states that it was brought in from the north-west.

The only ceremony he claims to have witnessed was held for the purpose of appeasing the anger of an evil spirit called Mindi—

> "Rude images, consisting of one large and two small figures, cut in bark and painted, were set up in a secluded spot; the place was strictly tabooed; the men, and afterwards the women, dressed in boughs, and having each a small wand with a tuft of feathers tied on it, were made to dance in single file, and in a very sinuous course towards the spot, and after going around it several times, to approach the main figure, and touch it reverentially with the wand."

While it is not clear to whom this place was tabooed, since both the men and the women were made to attend this ceremony, it is evident that he refers to a sacred place, and while he does not state where it is, we may take it for granted that it was in his territory.

The ceremony itself almost amounted to an act of worship, and as such even the brief description he gave of it is significant. Mindi was supposed to have been a very, very long, thick, and powerful snake, visible and yet invisible. He caused just about every bad thing that happened to the aborigines, especially in regard to ill health and epidemics. Some tribes believed that he only moved from his home to ravage the country when ordered to do so by Bunjil, the Great Man, who was a kind of Creator and Law-giver. It is therefore easy to perceive the identity of the three bark figures, the larger one, which was touched reverently with their wands by the participants, represented Bunjil, and the other two of his wives, the Koonawarra or Black Swan Sisters. The ceremony obviously was an endeavour to placate the ire not of Mindi, but of Bunjil, who would then order Mindi to desist from his work of destruction.

It is most unfortunate that the exact locality where this ceremony was performed was not given by Parker. Local historians and naturalists have so far only found two localities where this could have taken place. One is on a level stretch of ground south of the Cairn and west of Mt. Franklin, on the east side of the alternative road which leads from the Cairn to Daylesford, and on the south bank of a small tributary to Jim Crow Creek. This place has always been referred to by local tradition as "the corroboree ground".

No signs of aboriginal activity is discernible there, and none should be present, since corroboree grounds were kept clear of all that could impede the performance of the ballets. Certainly, fires were lit, but these would hardly leave an impression today, especially since the ground has been cultivated.

It may be argued that Parker stated that the ceremony was held in

Four of the five remaining stones arranged in a straight line as described in text. (The fifth stone is outside the photograph to the lower left.)

Photo: Author.

a secluded spot, and that the place now under review was too close to the Station to be secluded. However, no date was given by Parker, and this ceremony could have taken place during his early days amongst the natives, when he was still at Neeriman, some miles away. It is certain that no such ceremony would have been permitted by him after he was well established amongst the aborigines.

The second locality where the ceremony could have taken place is on the south-west foot of Mt. Franklin, where there are still some stones arranged in an orderly manner, thus suggesting the work of man and not of nature. This conclusion was also reached by the eminent archaeologist Mr. D. A. Casey, who visited this site during a recent field-day staged by the Daylesford Historical Society.

The arrangement consists of 5 large stones, measuring roughly 15 inches to 18 inches on average in length,

The circular arrangement of stones as described in text.

Photo: Author

and 7 inches to 10 inches in width, placed on a straight line running east and west, evenly spaced over 15 feet. The stones protrude about 7 inches above the soil, and are also embedded to a depth of about 7 inches.

About 50 yards west of the stones there is another arrangement consisting of a large flat boulder set up on a little mound of earth, encircled by a number of lesser blocks of quartz and quartzite. This circle measures about 5 feet in diameter.

The evidence that this is in reality the work of aborigines and not of white men rests mainly upon the fact that farmers and miners would have been too busy to spend their time arranging stones. Against this reasoning, there is the possibility that the quartzite was brought to the surface during mining operations, and that it therefore post-dates the aborigines; but there is a small natural outcrop of this stone on a low hill some 50 yards away, and the stones could have been obtained by the aborigines from there.

The present owner of the paddock, Mr. F. G. Powell, stated that the stone fences surrounding it were erected over 100 years ago. He purchased the paddock about 12 years ago from a man, now dead, who was much more interested in mining than in farming pursuits. The paddock is, therefore, virgin ground, and it is possibly the only one in the district where the surface stones have not all been picked up and placed on the stone fences.

About two years ago Mr. Powell began to gather some of the remaining surface stones, and it was then that he first noticed the arrangement. This appearing odd to him, especially since these particular stones were of a different colour from the others scattered about the paddock, he left them where they were.

Some time later, becoming interested in "aboriginalities" he had another look around the paddock, and was rewarded by the finding of several stone implements, this suggesting that a camp site existed close to the arrangement.

If this was a stone arrangement of the orthodox type, as the remaining stones would suggest, it was no doubt used for the initiation of youths, the last time probably during Parker's early days amongst them. When Parker moved to Mt. Franklin he must have become aware of the existence of this arrangement, and would have forbidden its use. In any case, it is likely that by then there would not have been enough pure blooded youths to initiate; half castes were always looked upon as being white by the aborigines, and they were never initiated.

Then came the gold-rush, followed by the making of the stone fences, which spelt the end of these arrangements throughout Victoria, with the sole exception, as far as I am aware, of the one at Carisbrook (see Massola, *Vict. Nat.*, **80**, October, 1963).

One more point has to be mentioned. This is the swamp which, according to Parker, was a favourite camping place of the aborigines, situated almost at the north-west foot of Mt. Franklin, and just around the corner from the stone arrangement. Its native name was Lar-ne-barramul, Lar = camp, ne = of the, barramul = emu. Aborigines always had a good reason for their nomenclature. Mt. Franklin, Lal-jham-boorp, for instance, has got a split head. This is a descriptive name. Yandoit, on the other hand, was probably Yandoeeth, Messenger, suggesting that something happened in respect to a messenger at that place. This would be an historical event, thus commemorated. The name camp-of-the-emu belongs to

neither of these classes, since it is most unlikely that emus "camped" there.

Isn't it more reasonable to assume that this was the place where the Emu-totem ancestor was believed to have camped when he made the stone arrangement? If this were so, then this would also be the place where the Emu-totem youths would have to camp while undergoing initiation at the nearby stone arrangement.

Acknowledgements

I wish to express my gratitude for help and information freely and unreservedly given by Mr. Edgar Morrison, Mr. John J. Alderson, Mr. Garry Griffiths, and Mr. F. G. Powell.

AT LAST !

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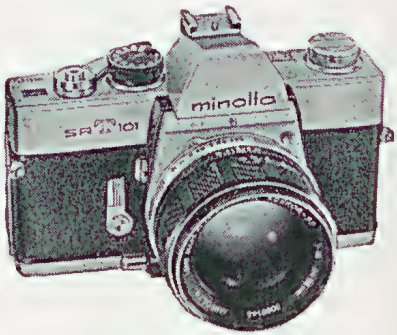

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Microscope Slides for Naturalists — Part 1

By H. A. Dade

At the higher levels of biological research, the preparation of microscope slides involves a great diversity of elaborate technical processes; but this fact should not deter amateur naturalists from making useful permanent records of their studies by quite simple methods. These methods fall into two categories, one in which no special preliminary treatment of the material is required, because the medium in which it is to be mounted, is compatible with the water in the cells of organic tissues; while in the other method, the material must be dehydrated, before it can be mounted in a medium which will not mix with water.

In this first paper we shall consider the first and more simple of these two techniques, which is suitable for a great variety of organisms, including algae, micro-fungi, parts of mosses, small crustacea like water-fleas, many of the small aquatic larvae of insects, and similar animals and plants.

The manipulation of material and its arrangement on the slide is most conveniently carried out with a preparation microscope. The F.N.C.V. microscope is very suitable for this purpose if used with a 50 mm. (2-inch) objective, and fitted with erecting prisms which enable tools to be used with ease. The only essential tools are two coarse needles, fixed into wooden handles, and broken off short so that only ¾ inch projects, to ensure rigidity; a pair of fine forceps (watchmakers' forceps, type HH, are far more useful, as well as being much cheaper, than so-called "biological" types); and one or two pipettes made from 7 mm. glass tubing. (In a club like the F.N.C.V. it should not be difficult to find a member who can manipulate glass tubing and will make pipettes for other members.)

The preparation of mounting media should also be organized, making use of a member who can weigh and measure the components. Made up in bulk, the media cost very little, and their formulation is free from doubt. Purchased ready made, they are expensive and dubious.

Preparation of Mounting Media

The fluid media described here fix the material (i.e., kill the tissues rapidly), render it transparent, stain it (if a dye is incorporated), and preserve it. The quantities given in the formulae which follow, are based on the assumption that six workers will want 50 ml. (2 fluid ounces) of each of three versions of lactophenol. Cotton blue is the most generally useful stain; but in a few cases some other stain may be used. Many objects do not require staining.

(1) Lactophenol—Three versions of lactophenol are described and all are based on the foundation formula "A",

"A", foundation formula: Phenol (carbolic acid) crystals, 200 g., lactic acid (syrup), 161 ml., pure glycerol, 313 ml. Mix the constituents and warm them in a glass beaker or porcelain basin, stirring with a glass rod until the crystals have dissolved. Divide the solution into three equal parts, each of 240 ml. Filter the solution through coarse filter paper.

"B", Plain lactophenol: Solution A, 240 ml. Add 60 ml. water. This is the working medium for all material which does not require staining.

"C", Blue lactophenol: Make up a stock solution of 0·5 per cent. cotton blue (powder dye), [1 g. of the dye in 200 ml. water], warming and stirring it until the dye has dissolved. Filter the solution. Add 60 ml. of this solution to 240 ml. of solution "A". This produces a final concentration of stain of 0·1 per cent. This medium is sometimes used at full strength in a preliminary treatment; at other times it is diluted by adding solution "B". Solution "C" is used for colourless material which becomes virtually invisible in plain lactophenol.

"D", Coppered Lactophenol: This mountant preserves the green colour of algae, mosses, and the like. The preparation is as follows:

Dissolve in 100 ml. water, copper acetate 1 g., and copper chloride 1 g.; (or 0·8 g. if the chloride is anhydrous). Add 60 ml. of this solution to 240 ml. of solution "A".

All versions of lactophenol must be stored in *brown* glass bottles to prevent discolouration caused by white light.

(2) Glycerine mountant—This is a very good mountant for small animals and for insect dissections or viscera, also for some plant material. Its refractive index is somewhat lower than that of lactophenol, and it therefore shows up fine markings which disappear in lactophenol, such as the finely detailed sculpturing of fungus spores. No mounting medium has a refractive index as low as that of water, and therefore all material should be examined in temporary water mounts.

"E", 50 per cent. glycerol: Mix equal volumes of pure glycerol and water. Heat the mixture in glass or porcelain until it reaches boiling point, and immediately allow it to cool. This is to drive off air dissolved in the fluid, and thus to prevent the formation of small bubbles in the finished preparation. Prolonged heating spoils the medium. When the solution has cooled down, add 4 ml. formalin (38-40 per cent. formaldehyde) to each 100 ml. For six workers 300 ml. will be required.

The most convenient form of bench bottle for all these media is the 2 oz. (50 ml.) hexagonal brown glass dropping bottle used by pharmacists for dispensing eye drops. The pipettes supplied with the bottles are much too coarse, and must be replaced by glass tubing drawn out to fine tips, or, if it is preferred, by glass rod drawn out to a taper, ending with a small spheroidal point about 2 mm. diameter.

One 50 ml. charge of each of the media "B", "C", "D", and "E" will be sufficient for many months of work by each user.

Slides

These should be 3″ x 1″ and of medium thickness (1·0 to 1·2 mm.). Grease-free slides, prepared for blood and bacterial smears, should be avoided: as they are quite unsuitable for fluid mounts because the medium spreads over the surface of the slide, and thus prevents sealing. When it is necessary to wash slides, hot water and detergent may be used; this does not remove the last traces of grease.

Cover-glasses

May be of No. 2 thickness. The thinner No. 1 covers are more suitable for use with oil-immersion lenses, but mounts of the kind we are considering are not usually examined with very high powers. The size of the covers will depend on the objects which are to be mounted, but they should not be too large. A sound principle in microscopy is that the smallest possible covers should always be used because

it is much easier to make a successful mount with small covers. The writer rarely uses covers more than $\frac{1}{2}''$ in diameter, and $\frac{5}{8}''$ should be regarded as maximum. Dealers usually try to sell $\frac{7}{8}''$ or $\frac{3}{4}''$ covers, but these are suitable only for smears or for large balsam mounts. A limiting factor in the case of fluid mounts is the free area of the slide on which cement is to be laid.

Should the covers be square or round? Square covers may be preferred by beginners, because it is very easy to seal them. Round covers produce a much neater and more pleasing appearance, but a turntable is necessary for sealing them (see below, under *Sealing*).

Cover-glasses should be kept in small jars of methylated spirit, and when taken out for use, they can be dried on a clean handkerchief. This is easier and more successful than trying to polish dry covers.

Fluid mounts must be sealed to hold the cover in position, and to prevent exudation of the medium. Lactophenol used to be regarded as a purely temporary mountant because, when it was sealed with the traditional cements which were resinous, the mounts quickly became filled, and the objects obscured, by myriads of minute oily globules. These were the result of reaction between the phenol in the lactophenol and the cements, and not of any defect in the medium. Now, however, we have a cement which is quite free from this disadvantage, and lactophenol mounts may be regarded as permanent (the writer has slides made over 25 years ago which are still in perfect condition). This cement is nail lacquer, which adheres very firmly to glass and does not become brittle. Colourless lacquer is used for the first two coats, and afterwards, the mount can be finished with coloured lacquer or with "Duco" enamel, the latter being more economical. No. 3 water-colour brushes of sable or squirrel hair are used for applying cement. To eliminate the nuisance of cleaning them after use, they can be suspended in the vapour of a solvent, which prevents them from drying up and keeps them always ready for use. Each brush is inserted into a cork and plugged into a small bottle or tube containing about $\frac{1}{2}''$ of "Duco" thinner, the end of the brush being just above the surface of the fluid. Two brushes will be required, one for the colourless lacquer, the other for the coloured lacquer or enamel. The most convenient vessels in which to keep the lacquers are balsam bottles with ground-on caps. Alternatively, small lever-lid tins, like those in which model aeroplane enamels are sold, may be used.

Mounting in plain lactophenol

The object to be mounted is placed in a small drop of the medium on the centre of a slide, and is arranged there; a cover-glass is then laid on the drop, and the object is thus enclosed in a drop of medium between slide and cover. After this has been done, it is most important that the upper edge of the cover-glass and the adjacent surrounding surface of the slide should both be perfectly dry in order that the cement, which is next to be laid on, should adhere. It is therefore necessary that precisely the exact volume of medium has been judged.

A centring guide should be prepared, either by tracing an outline of a slide on to a white card, with diagonals to indicate the centre; or more preferably, by cementing three small glass or plastic stops on a white tile, against which the slide can be positioned, with its centre being marked by a small black spot on the tile. On the centre of the slide place a small drop

of the mountant, trying to judge as well as possible how much is required. In this, place a small quantity of the material which is to be mounted. It is important to take the *smallest possible* amount of material that will show the features desired; a common mistake is to mount too much, which obscures rather than clarifies the view. Arrange the material with the needles, teasing it out if it is a filamentous alga or fungus, and separating parts of other objects so that they will be distinctly visible. Examine under the microscope and complete the arrangement. Note also any tendency of the material to collapse, as may be the case with some cells. If this occurs, warm the slide gently over the flame of a spirit lamp or micro-bunsen burner, but do not overheat it or the object may "spit" and leave the slide. On no account must animal material be heated, for having no cell walls, animal tissues explode when heated. Now take a cover-glass and dry and clean it on the cotton handkerchief, which should be very clean, or it will smear the glass (after washing, the handkerchiefs used for this purpose should be thoroughly rinsed at least three times). Hold the cover with the forceps, and lower it slowly on to the medium, and prevent it from moving, when the forceps is withdrawn, by steadying it with the point of a needle held in the other hand. If the medium does not completely fill the space between slide and cover, apply very gentle pressure to the cover with a needle or the forceps point, near the centre of the cover, not at the edge; this will usually suffice to complete this part of the procedure, and the mount will be ready for sealing. If too much medium has been used, it will exude at the edges of the cover, and sealing will be impossible. If too little, it cannot be made to fill the space. A little experience will enable the beginner to judge the correct amount of medium in most cases. It is usually better to discard the failure and to begin again, but if material is scarce or if for some reason the preparation cannot be thrown out, more experienced workers can often rectify errors by methods described later. Sometimes it becomes apparent before covering, that too much medium has been used; it is then often possible to remove a little with a capillary pipette (a glass tube drawn out to a very fine point). A pot or dish of water and detergent should be at hand, in which to place discarded mounts until a number has accumulated, when the slides and covers can be washed.

Coppered lactophenol (medium "D"), which preserves the green colour of some plant material, is used in the same way as plain lactophenol, the preparation being gently warmed before covering.

The 50 per cent. *glycerol medium* ("E") is also used like plain lactophenol, except that warming is unnecessary.

Blue lactophenol (medium "C"), is used when staining is necessary, and the procedure is not quite so straightforward as in the case of other media. There are two versions of the method:

(i) staining in a high concentration of the dye, followed by transferring the material to plain lactophenol for finishing;

(ii) a single-operation technique, mounting directly in weaker blue.

The first of these is more satisfactory when the material does not suffer damage in the operation of transferring it to the mountant; the second method must be employed when very delicate material will not stand this manipulation.

In the first case, "C" at full strength is used, a large pool of it being placed on a slide with enough material for several mounts, heated, and it is then

set aside for a short time while the stain is taken up. It should be watched, under the preparation microscope, until staining is adequate. A little of the stained material can then be sorted out with needles and removed to *plain* lactophenol on another slide, and a few extra slides can be made in the same way.

In the second method, when delicate material is being mounted directly in dyed lactophenol, the full strength "C" medium must not be used, but a few drops of it must be diluted with plain lactophenol. This can be done on a slide, stirring the two media together until the required colour is obtained, judging by eye. The degree of dilution cannot be stated, for it depends on the material. Some tissues take up stain more readily then others, and staining often continues after the slide is finished and sealed. Experimentation is therefore necessary, and a little experience will provide guidance. As a rough guide, it is suggested that a mixture of 2 parts of plain medium be added to one of blue. Heating accelerates staining, and plant material should therefore be warmed in both the methods just described.

Thorough teasing out of the material is very important in the case of staining media. If material like an alga is not teased sufficiently, only the outer edges of the tangle will be stained and probably overstained, while the middle of the mass will be quite colourless.

Rectifying errors

Anyone, however skilled and experienced, will sometimes misjudge the correct quantity of medium necessary to fill exactly the space between slide and cover. In most cases it is simpler to discard the slide and start again, but if there is not enough material available for this, all is not lost. If too much medium has been used, and is exuding from the edges of the mount, or is clearly going to during later operations, the worker should proceed as follows:

Lay a small slip of blotting paper over the slide, anchor it by pressure on the slide at one end and then run a finger very gently round the *edge* of the cover, avoiding any pressure at all on its middle. The blotting paper will take up the excess fluid, but there will be some wetting of the slide around the cover. If too little medium has been used, it will not fill the space under the cover, but will leave a space at one side. With a fine wire or blunt needle, take a small drop of medium and apply it to the slide against the unfilled arc of the cover; it will run in. Repeat this if necessary until the space is filled. With blotting paper, remove the surplus medium. Again, the slide will be wetted where cement is to be applied, and this will have to be remedied later (see below).

In some cases, unsightly air bubbles may be enclosed in the mount. These can sometimes be removed by gently warming the slide while it is slightly tilted. Bubbles are sometimes trapped by material, the surface of which is difficult to moisten. The spores of some micro-fungi are notoriously difficult in this respect, but they can be wetted by first treating them with ethyl acetate, which is afterwards removed without difficulty when the lactophenol is warmed. It is usual to handle these fungi by taking up a tuft of the sporophores on the point of a needle. Add a drop of ethyl acetate to the shank of the needle and let it run down to the point, where it will wet the material. Tilt the needle to allow the surplus acetate to run back towards the handle. Proceed with mounting in the medium in the usual way.

Sealing

If the cover-glass has been applied successfully, and the correct amount of medium has been used, the mount is ready for sealing. The first two coats of lacquer must be colourless. Occasionally a little lacquer will run under the cover, although this is very unusual; but if coloured lacquer runs under, its dye will be transferred to the lactophenol, and will spoil the preparation. Colourless lacquer however does no harm. When square covers are used, it is a simple matter to lay a band of lacquer on each side of the cover, partly on the cover and partly on the slide. The lacquer should be *run* on from a well-filled brush, *without pressure,* so that no movement of the cover occurs if it is slightly overfilled. When the first coat has dried thoroughly, which it will do very quickly, another can be laid on. Subsequently, further coats of coloured lacquer, or of Duco enamel, must be applied, until the edge of the cover-glass is no longer conspicuously sharp, but well rounded off by the thickness of the cement. The old traditional cements, such as shellac varnish, had to be applied in innumerable coats, and they dried slowly. Nail lacquer can be laid on comparatively thickly, and it dries quickly, so mounting slides is nowadays a much easier task.

Round covers have a much better appearance and are in some respects more durable, for there are no sharp corners to make weak points in the seal. Slides with round covers must be ringed on a turntable (a small, heavy brass disc, which revolves on a pin, and is spun with the fingers of the left hand while the right hand holds the brush. The slide is held firmly by springs). The slide should be centred exactly by correcting its wobble as it revolves. The brush should be well-filled, but not dripping, and it should be held as nearly vertical as possible. As the slide revolves rapidly, lower the brush until the lacquer which hangs from the hairs just touches the edge of the cover. Lower the brush a little until the lacquer takes the form of a band, but on no account apply pressure, which may very easily cause the cover to be displaced. Form a band of about 2·5 to 3 mm. in width. Lay the slide aside, protected from dust, until the cement is quite hard. Apply further coats, laying them on thickly, but again applying no more pressure than is necessary to cover the original coat. Four or five coats of coloured lacquer should be sufficient.

After a time, it will be found that the lacquer does not run freely on to the slides. This trouble has two causes. Frequent exposure to air results in the lacquer losing some of its solvents by evaporation, and thus becoming too thick. That is easily rectified by adding a few drops of Duco thinner to the jar or can. Another cause of the trouble is the evaporation of thinner in the tubes in which brushes are kept. It will be found that the thinner has collected lacquer from the brushes, and has become very thick and syrupy, while the brushes have become clogged by partly dried lacquer. The remedy is obvious: both brushes and tubes must be cleaned with thinner, and a fresh charge of this solvent must be placed in the tubes.

Slides which have been wetted around the covers have now to be dealt with. A *very narrow* band of cement should be laid on around the cover. This will not seal the mount, of course, but when dry, it will hold the cover-glass in position during the next operation, which is to wash off the exuded medium by holding the slide under a tap for a few moments. It is then possible to remove the water with a piece of blotting paper, afterwards laying the

slide aside to dry thoroughly. When it is dry, lay on a *wide* band of lacquer, overlapping the first narrow band and thus adhering firmly to dry glass.

A similar method must be used when objects like small larvae, which are too thick for the normal treatments already described, are mounted in cavity slides. Cavity slides are rather thick slides in the centre of which a depression has been ground and polished. Dealers always try to sell us slides in which the circular depressions are too large to permit satisfactory sealing. Cells, made from rings of glass or metal cemented to slides, are not usually successful; they introduce several problems and are likely to break down and leak when rising temperature causes expansion of the medium. (Large objects for examination under low powers should be mounted in the writer's "microjars" described in *Vict. Nat.* 1964, **80**: 375-7).

Mounting in cavity slides involves the use of a considerable excess of medium; enough to stand above the level of the slide's surface, so that the cavity is quite filled after the coverglass is put on. Laying on the cover causes the excess medium to be expelled, so the slide is thoroughly wetted. This excess fluid must be removed as well as possible with blotting paper, again taking great care to avoid pressure on the middle of the cover, which would have the effect of forcing out too much medium and then drawing in air bubbles. Next, the cover must be anchored by placing a number of small beads of cement at intervals round its edge. When they have dried, the slide can be washed under a tap, dried, and then sealed in the usual way.

Slides made by this technique can be rendered very robust and permanent by reinforcing the nail lacquer with an epoxy resin, which sets cold. Only one suitable kind is known, Araldite AZ.107, which sets to form a seal so hard that it can only be broken with steel instruments, and which is perfectly watertight. It can be applied after the first two preliminary coats of lacquer. Unfortunately, it appears that Araldite AZ.107 is not at present obtainable in Australia.

All slides should, of course, be labelled, and in addition to the usual name of the organism and its identity numbers, etc., usually on the left hand side of the mount; details of the mounting process should appear, perhaps on another label at the other end of the slide. These details should include the date of mounting, the medium used, and the cement. Such data will be of interest in years to come.

(The second part of this account will deal with the mounting of insect parts in Canada balsam.)

Readers' Nature Notes and Queries

These columns are available for all members, young and old, to bring before others their own observations in nature. Correspondence may be sent to the Editor, 54 St. James Road, Heidelberg.

Here are two more interesting accounts of trips in the series written by Mr. Victor Jacobs of Narre Warren North.

Churchill National Park

Lying about 20 miles to S.-E. of Melbourne, and for anyone interested in fungi, this is a good area.

In mid-May of 1966, we were able to obtain some good colour slides of fungi, but their identification is incomplete.

In the thick tea-tree on the flats, the birds were easier to hear than to see. There were Grey Thrushes, Grey Fantails, White-throated Tree Creepers, and Bell Birds. We climbed to reach the banks of a man-made watercourse, on which were growing Black Wattles, Sheokes, Gippsland Mallee (*Eucalyptus kitsoniana*), Narrow-leaved Peppermint, Rigid Acacia, Hedge Acacia, and Cherry Ballart. From here we soon walked into the source of the Bell Bird's calls—a vigorous colony. Very few of the individuals exhibited the expected red spot behind the eye. Further along the drain, other birds were feeding. These included Welcome Swallows, Grey Fantails, Scarlet Robins, Eastern Spinebills, Yellow Robins and Crimson Rosellas.

Still travelling west, we reached the termination of the water course at a small holding pool, above which is a stand of young Narrow-leaved Peppermint Gums. In one of these trees at head level, a young Boobook Owl was sleeping; and on being disturbed moved a few yards away to a similar sleeping spot.

Lysterfield Reservoir

I had long desired to venture around the western side of this reservoir, situated to the S.-E. of Melbourne. The eastern public road skirts the water in close proximity to the reservoir, but the water birds either swimming or resting always seem to be nearer to the far shore. To move around this area requires firstly the supervisor's permission; and in winter especially, some effort, as its circumnavigation is not a casual walk. In the wet season the apparently straightforward and clear firebreak becomes a squelchy sticky quagmire, and often disappears under water. When this happens one leaves the track, and attempts to "scrub-bash" without losing sight of the water. I lost it many times.

In August of 1966, I entered through Mr. Sceally's gate and walked downstream of the dam retaining wall where the top and subsoils were removed during construction. Despite this, the Spotted Gums and Yates were growing tall. Cootamundra and Cape Wattles were in flower. The birds were extremely active, and I very quickly recorded Noisy Miners, Red Wattlebirds, Grey Thrushes, Magpies, Eastern Rosellas, Starlings, Sparrows and a flock of Yellow-winged Honeyeaters. Doves and Bell Birds called from the hillside.

Turning north along the margin of the water I surprised a sleeping Black Swan, two Dusky Moorhens, and a pair of Little Grebes. Whiteheath, Gorse, and Spanish Heath were in flower.

It was a most picturesque spot with vivid red clay, grey-green eucalypts, sombre green pines, lush green mosses with orange "spikes", purple splashes of *Hardenbergia violaceae* scrambling over small granitic boulders, and grey lichens on even the smallest piece of rock.

Throughout the walk I saw good specimens of Hedge Acacia and Lightwood smothered with massed blossom. The birds observed were Yellow Robins, Eastern Spinebills, Brown Thornbills collecting dead pine needles, Blue Wrens, White-naped Honeyeaters, White-eared Honeyeaters, a Yellow-tufted Honeyeater (which was a better match for the illustration in "Cayley" than the one in "Honeyeaters of Australia"), Grey Thrushes, Magpies, Bellbirds, and White-plumed Honeyeaters.

A Hardy Wattle

This note comes from Mr. K. C. Rogers of Gippsland.

Last October, when crossing one of our paddocks, I noticed near the track what at first glance appeared to be three yellow mounds low to the ground. On alighting from the vehicle, I realized that what had attracted my attention was the cushion-like growth of three wattles. Each plant had been so trimmed by the sheep through the years, that a hard and dense "mound" was all that remained, though the plants were still able to function and were covered in bloom. They were the more striking owing to the almost complete absence of foliage. The largest plant was about two feet wide by one foot high and the other two somewhat smaller. A few more plants of similar form are scattered over the same paddock.

An interesting fact is that these wattles have withstood the nibbling by sheep for over 40 years. Naturally many have died out and these will probably go too in the course of time.

This particular wattle is the Dagger Acacia (*A. siculiformis*) and usually grows as a scraggly shrub to a height of six to eight feet, when not interfered with. It is the least attractive of district wattles and is widely distributed on this tableland which lies 40 miles north of Buchan, and just under 3000 feet elevation. Whilst common along streams, this acacia is also frequently found on the highest mountain tops of 5000 feet or more.

White-naped Honeyeaters

M. O'Donnell of Greensborough sends this observation on White-naped Honeyeaters.

Some two or three years ago I made some observations to the F.N.C.V. regarding the flock behaviour of the Spotted Pardalote in Greensborough. In August last my wife and I noticed a rather similar phenomenon, this time in connection with White-naped Honeyeaters. These birds are fairly common in sporadic numbers in this semi-rural area of North Greensborough, but we haven't seen them in flock proportions previously. There were some 40-50 birds acting in agitated manner in a mature Acacia baileyana (about to blossom in a week or two). The birds seemed hungry, eagerly bending down over twigs and peering closely into the inflorescence of the wattle. They did not dwell long in one position and after a few minutes quit this wattle in favour of some taller Yellow Box trees nearby. We put out on the flat roof a dish of syrup for the birds, but had no response.

Is this flock behaviour (apparent group food-seeking) a prelude to pairing off in preparation for the mating season?

It is a fact that many species of Honeyeaters are of a gregarious nature; but in this case, pairing-off may have been about to take place.

[Ed.]

Correction

I read with interest and appreciation Mr. Jernakov's article on the flora of "Long Island" (*Vict. Nat.* Nov. 1967) and am sorry it was marred by two misdeterminations of species for which I must take responsibility.

Knowing that *Drimys lanceolata* (a forest species) does not grow in the place referred to; and not knowing the alpine sedge *Carex jackiana* at all, I asked Mr. Jernakov to let me see the specimens involved. As well as a vegetative specimen which I had determined very tentatively as *Drimys*, there was a good flowering spray, and it was certainly not *Drimys*, but *Myoporum insulare*, while the sedge, for the naming of which I cannot account, though I am responsible, appears to be typical *Carex pumila*, a common coastal species which has slender curled leaf tips and dense flower-spikes, while the spikes of *C. jackiana* are described as loose, and the leaves straight. I hope this correction will remove any source of confusion from an article of a type we need, and for which we can be grateful to Mr. Jernakov.

J. Galbraith

Spotlight on Pseudocheirus

by H. M. W. P.

Here is a report in lighter vein (in contrast to the rather more detailed work involved in Mammal Survey Group reports), of a party from that group which explored an area in the Upper Thompson Valley towards the end of 1967.

At the author's request, only the initials of the four members of the party appear. (Ed.)

7.20 p.m. Thirteen of us standing on the bridge waiting for darkness to come, arguing about how much water was going by. Arthur went down and measured the depth. Nearly fell in (some splash *that* would have been). Then the flow velocity. Floated leaves and twigs on the surface but they got stuck under the bridge. Some even came back upstream. So we abandoned science and guessed at 10 cusecs, which Jess had guessed at in the first place (what on earth is a cusec? she'd asked). Multiply by 6·25, by 60 and 60 and 24. Too much for anyone's head. Six million gallons a day or 0·6?

7.40 So the four of us left them there and started off up the piece of road assigned to us. "Happy hunting, don't get lost, mind the elephants."

7.44 What one of us called twilight. A Ringtail in the spotlight. Was this going to be one more mountainside of forest inhabited wholly by these silent, solitary creatures, gawping at the spotlight?

8.00 A cool still night, half a moon, high up. Every crackle and rustle audible. A hunter's dream (but no, that's a rude word in this company). Listen, was that a creature or just a piece of bark peeling off? No movement, no reflected eyes in the beam. No. Nothing.

8.22 A sudden rustle, a frightened noise. No, lower down, a bit to the right, no not the left (it was a girl with the lamp), there it is, no couldn't be, yes it is, it's a Leadbeater. Are you sure? Yes it is, what ho, a real unbelievable Leadbeater, look!

And there was this busy, cheeky little chap (or girl, we weren't going to be personal) running up a bit, round and down again, jumping across to another twig, looking from this side and then from the other, intensely interested in this hot beam of candlepowder. Neat little Walt Disney face. Bright eyes. Catch-as-catch-can.

What odd people zoologists are, giving that name to this little fellow when memory takes one straight back to ponderous old *Bucorvus* (of the same name) echoing his muffled trumpet into the heavy silence of the African bush at first light.

Well, what triumph! What a stroke of luck! Doesn't matter now if it *is* going to be a monotonous diet of *Pseudocheirus peregrinus* for the rest of the night. Forget the mosquitoes, forgive the flies (for a little while anyway), pardon the dust, the miles we've come, the spilt battery acid, the lost trap tags and all the other imperfections of memory and performance. Then another rustle, loud above our chat-

tering. Couldn't be. It certainly is, it's another one! Younger, not quite so cock-sure, not quite such smart markings (or are they, could memory fade in so few moments?). Look at him from just two or three feet; neat dark dorsal stripe, right to the tail, clean toes, tidy little face.

So on we walk. Wouldn't the others be envious! Almost like finding *Burramys*.

8.46 There's something—probably another Ringtail—or is it? Pinkish eye; "Move Charlie," yes, a Ringtail.

8.55 A crackling in thick bush. Just once. Dead silence. Lights on. Nothing. David advances through the thicket amidst thunderous noise (why didn't they christen him Goliath?). A little frog squeaks just before David's boot descends, complete with foot and ancient sock, into the unexpected mud. Another rustle from somewhere above, drowned by expletives and some laughter. After all, we've seen Leadbeater (*Gymnobelideus*, not *Bucorvus*), so what's a sodden, squelching boot!

9.00 A quick hurried little rustle on our left, low down. (What a pleasant change to have such a still night that one can hear these things). There it is, no, just here . . . *another* Leadbeater. The same quick decisive movement, still for a second or two, then up across and down again on the other side of the stem, staring and sniffing at us for a second or two upside down, then up quickly, out of the light and gone. The lights fumble around and find him, six feet up, and then down he comes again, almost to the ground. Sniff, sniff, then quickly off to one, two, three little stems in lightning hops, and hop-hop back again, up the other side of the trunk, round and on to a branch to stop and stare. Ten seconds it seems and the act is over. Did he have a pale tip to his tail? No answer. Shamed silence, we can't remember.

9.50 Getting a bit cold, about a mile and a half from the bridge. No, it must be more. Then there, high up, on a stark skeleton of the '39 fire, a little grey face with the same sort of markings, gazing down at us, the rest of him hidden by the tree trunk. Not *another*? The place is dirty with them. "Extinct" from 1909 till 1961—impossible. But the lamp is getting dim, must change the battery. Damn, a wire is broken. John, have you got that fancy penknife? And the terminal's all corroded too. But the maligned Swiss army fixes it and the lamp is rejuvenated. He's still there, facing downwards now, in full view. Binoculars! Tangled up with shoulder straps, misted up with clumsy thumbprint (much like David's boot in the swamp), out of focus, but, finally, yes there he is. Handsome chap. But wait, what's that white concertina behind his elbow? Leadbeater isn't supposed to have a membrane—of course, you fool, it's a glider. (Thank God we had another battery). Yes, the Sugar Glider *of course* (we say who'd never seen one). That's why he's bigger and so transfixed. And he *has* got a white tip to his tail, just like a finger nail. But he won't move.

10.30 And so the night goes on. It's cold now, and the batteries have become heavy. Time for a "smoke-oh". Chatter chatter. Five Leadbeaters so far, in one evening, unbelievable. And we're only half way through. A niggly breeze arrives, so off we tramp again.

10.50 A pair of eyes twenty yards away on the right, pinkish. A Ringtail? A bit closer, more light. No he

hasn't moved. Seems a bit lethargic, even for a Ringtail. Why is the forest so thick when you specially want to see through it? Where's his tail anyway? No, it's not a Ringtail, it's a Bobuck, sitting there comfortably in an armchair gazing unconcernedly and sleepily at us in a rather over-fed way. That makes four species now, in one night, so far. Rich forest this.

11.00 A large, dark fellow, quite high up, thick foliage; we stumble about; yes, he's still there. Glasses again. By George, a Greater Glider! (George who? says the other David—the fire of youthful enthusiasm rapidly fading now). Jet black; fine big chap; slow movement, pretending to hide. Some noise from us and up he goes a bit, across on to a branch to take up the stance of the textbooks (expecting a fee perhaps?). But how poor the textbooks are, and what *would* the soap advertisements give for this brilliant black and white? Five species in one night! We wonder (with crocodile tears) what the others have seen.

11.47 With four more busy little Leadbeaters on our records and outwardly, but not inwardly, flagging a little, a noise like a bulldozer comes through the forest. Then lights, . . . it's only a car, but who on earth would be driving around at this time, twenty miles from anywhere? Painful headlights assault us and the car stops, clouds of dust, noise. Who is it? What does he want? It's Bill.

"Thanks Heavens I've found you, we thought you were lost."

Lost! What a painful wound! What an embarrassing, cowardly insult! A search party indeed! Did you ever hear of such nonsense! Well, we won't tell him. Disturbing us and all those little (special) possums. We might have seen fifteen if he hadn't put an end to it.

"What did you see, Bill?"

"Ah, we've seen the lot, Yellow Belly Gliders too."

"Where Bill?"

"Oh, there are dozens of 'em about half a mile the other side of camp."

"Do you think you could drop us there Bill, we'll walk back?"

"All right, but I'm going to bed."

Long silence . . . (he wasn't going to tell us either).

"Bill, did you see any Leadbeaters?"

"Yes, eight of them. Place is lousy with 'em. Did you?"

So our stature shrank, audibly. Yes, we'd seen them, all along the track (but at least we'd seen more than he had). Past the camp, two dim lights showing. Lazy people, fancy going to bed on a night like this; it isn't even raining.

Disgruntled instructions from Bill as to where the Yellow Bellies had been seen, rather staccato, even for him, and when the noise and the lights disappear with Bill towards his sleeping bag (I hope it's damp, spoiling our night like that) we turn into the forest again. A quiet track, newly bulldozed in the damp earth. No sound, the moon casting long shadows now. Then suddenly a call, a chatter, way off on the right. That's one (Jill knew them well) but he's too far off. They call like that just before they take off.

12.05 A loud crackling noise, high up, fifty yards away, loud enough to be a bear climbing a tree. Lights, glasses. Yes, believe it or not, and thank you Bill, a Yellow Belly. Six species in a night, one special one and four of them new to most of us.

12.20 Well, we'd better get back to camp. I *am* getting just a bit weary.

12.25 Another pair of eyes straight above us, sixty feet up, another Greater Glider. How the Fates have favoured us tonight!

12.36 On the last half-mile back to camp; seen enough to last us years. The lamps are yellow and dimming fast, the recorder's pencil blunt, his piece of notebook folded, grubby, scrawl awry, and then, just to ask forgiveness for Bill for what he did, two more Leadbeaters. Close-by, no need for brilliant lamps. Good night "fellas", thank you for being so co-operative, but we *must* get to bed. But we still talk. Lead-footed, tired, the batteries very heavy now, we talk. Talked so that we walked right past the camp turn-off and fifty yards beyond. Shamedly admit it and return.

01.10 A chair, damp with dew, a shot of grog to revive the body. Revived the tongues too. What don't we talk about, hushed, in the setting moon? The drought, fires, politics, equal pay, but always back to our six species, Leadbeater, Sugar Glider, Greater Glider, Yellow Belly, Bobuck and . . . and . . . oh, sorry Ringtail, we didn't really forget you.

02.00 Sleeping bag. Deadbeater.

Mammal Survey Group

Mammals of the Metropolitan Area

In addition to the surveys being undertaken further afield, the Mammal Survey Group is commencing a survey of the mammals of the Metropolitan area. This will be based largely on locality records for mammals in the Melbourne suburbs, with attention being directed initially at the two possums common in Melbourne, the ringtail *Pseudocheirus lanuginosus* and the brushtail *Trichosurus vulpecula*.

The group therefore requests all F.N.C.V. members to help. Reports of sighting of either of these possums (or any other non-domestic mammal) would be greatly appreciated in expanding our records. All data will be plotted on a map of the Melbourne area. Specific details of localities are needed, so that they can be pin-pointed in a street directory, with details of date, time of day and surroundings.

Information should be sent to the Hon. Secretary, Mammal Survey Group, 39 Huntingtower Road, Armadale 3143.

Excursion with the Latrobe Valley Field Naturalists Club 1967

by T. F. Zirkler

We left Melbourne on Saturday 29th April, and at a number of stops to Dandenong we picked up various members until we numbered 36. This was fine, but we continued to do this and by the time we had reached Moe our numbers had increased by five more members in their own cars. Here, too, we picked up a member of the Latrobe Valley Field Naturalists Club who became our pilot. He led us out along the Walhalla Road past the turn-off to the Moondarah Reservoir. Along this part of the road we saw the Sunshine Wattle, *Acacia botrycephala*, in full bloom, a beautiful picture in the bush.

Views over the Thomson River Valley were breathtaking in their beauty of mountain scenery. We soon left the Walhalla Road with Mt. Erica, 4800 feet, on our left and arrived at our destination, the South Cascade Creek. We found here no less than fourteen car loads of members of the L.V.F.N.C., and a fine, friendly, keen group they proved to be. They led us, along a bush track, a favorite haunt of theirs, and which they had improved somewhat for their own comfort and now for ours. This track led over the creek and was a veritable fairyland of ferns and mosses, liverworts and lichens; too many to enumerate; but which kept the more knowledgeable of the party busy and for the rest of us proved a beautiful and interesting walk. When we raised our eyes, the Mountain Ash, *E. regnans*, and Mountain Grey Gum, *E. goniocalyx*, towered above us.

Then back along the road to Yallourn, where we spent the night. After dinner the L.V.F.N.C. invited us to an informal get-together. They showed us slides, and afterwards, over a cup of tea, we got acquainted. We found that as well as members of the F.N.C.V. and the L.V.F.N.C., we had Mr. and Mrs. Robbins from the Bendigo F.N.C., and on Sunday morning we were joined by members of the Warragul F.N.C. and two more of our own members—a most gratifying assembly of field naturalists.

On Sunday our hosts took us to an area adjacent to the Hazelwood water poundage, where an area of about 18 acres has been planted with native trees and shrubs. These were inspected as well as some snow gums, *E. niphophila*, along the road.

Our next stop was at the Martin Walker Reserve, where we had lunch. Here a creek flowed by and was bordered by magnificent specimens of manna gums, *E. viminalis*. From this idyllic spot we made for Fosters Gully, stopping on the way to look at a koala sitting high up in a Mountain Grey Gum; then down a steep gully to see the epyphitic orchid *Sarcochilus australis*. Down below, at the bottom of the gully, Gypsy Fern, *Clenopteris heterophylla*, Kangaroo Fern, *Phymatodes diversifolium*, and many others caught our attention. Another enjoyable day.

Then home by way of Thorpdale, a farming district which must surely be one of the most beautiful in the country. Back to Melbourne about 8 p.m. after another happy field naturalist excursion.

Hawthorn Junior F.N.C.

Office Bearers at January 1st, 1968:

President—Mr. D. McInnes

Secretary—Susan Beattie, 2 Clyde St., Glen Iris.

Treasurer—Jenny Forse

Asst. Treasurer—Tim Anderson

Excursion Secretary—Ian Knox

Editor and Club Recorder—Barry Cooper

1967 has been a year of continued prosperity for the club. Membership has increased slightly and reached 170 in March. Attendances at meetings and excursions have been maintained.

Meetings and Subjects held in 1967:

27th January, 1967—Members' Holiday Exhibit Night.
24th February, 1967—"Bats" by Mr. J. Hyett.
31st March, 1967—"Fossils of Mornington" by Mr. M. Harrison.
21st April, 1967—"Wilson's Promontory National Park" by Mr. R. Miller.
26th May, 1967—"Fungi" by Mr. B. Fuhrer.
30th June, 1967—"Embedding specimens in Plastic Resin" by Mr. I. Morrison.
28th July, 1967—Movie Films shown by Mr. Gurney.
25th August, 1967—Members' Exhibits Night and Celebration of 24th Birthday.
29th September, 1967—"The Origin of Rocks" by Mr. Leigh Winsor.
27th October, 1967—"What Gum Tree—Where" by Miss P. Carolan.
24th November, 1967—"The Origin and Evolution of Freshwater Mussels" by Dr. I. Hiscock.

Excursions:

Sunday, 26th February, 1967—Werribee Gorge (Geology and General).
Sunday, 2nd April, 1967—Fossil Beach, Mornington (Fossils).
Saturday, 27th May, 1967—Ferntree Gully (Fungi).
Sunday, 2nd July, 1967—Serendip Fisheries and Wildlife Dept. Research Station.
Sunday, 3rd December, 1967—You Yangs (General).

The Werribee Gorge Excursion was one of the most successful outings ever attempted by the club. Our indefatigable president spent a great deal of time planning our route, and a record 75 people attended the excursion. The whole day was spent in the area with picnic lunch and tea.

Publications:

Our monthly publication *The Junior Naturalist* has completed Volume 3. Additional publications produced during 1967 were:

The Collection and Preservation of Insect Specimens by Dennis Walsh (2nd Edition, completely revised and reset).
Gemstones and Minerals by Paul Gahan (2nd Edition, reprint).
Observation and Collection Record Book. Edited by Paul Gahan.

The Observation and Collection Record Book is the largest publication produced by the club. It contains introductory paragraphs on most natural history topics followed by record blanks for the reader's own recording. In all, this bound publication comprises 140 pages.

Nature Show:

The Club had five exhibits at the September Nature Show in the Lower Melbourne Town Hall. These included

1. Skulls.
2. Gem cutting.
3. Live reptiles.
4. Preparation of Plant Sections (combined with Microscopical exhibit).
5. Junior projects.

Library:

The F.N.C.V. continues to bring books for borrowing to our meetings.

Subscriptions:

Because of increased mail charges we had to increase subscriptions during the year. The new rates are: Junior Membership 80 cents per annum. Adult Membership $1.20 per annum.

Changes in Office Bearers:

The past year has seen an almost complete change and reshuffle of Club Office Bearers. We were indeed unfortunate that Michael Coulthard was unable to continue as Treasurer. In his short 14 months in office a complete reorganisation of finances was achieved. Our Secretary, Janet Fitzgerald also felt compelled to retire at the end of the year after 2½ years in that position.

Field Naturalists Club of Victoria

F.N.C.V. General Meeting
8 January 1968

About one hundred members attended. Mr. E. R. Allan presided. He asked members to stand for a minute in silence in respect for the memory of Mr. W. White, assistant editor, who died recently. The president acknowledged a Christmas card from Sir Rohan Delacombe.

It was announced that, because of Moomba, the March meeting would be on Wednesday, 13th March, when the election of the officers for 1968 would take place. As nominations had to be in two months before this meeting, the last day for nominations would be 13th January.

The subject for the evening was "Members' Night". Mr. J. R. Garnet showed colour slides taken on a two-months safari to beyond Cooktown. These included Black Mountain 1400 ft. high with tumbled granitic rocks, the black being due to a surface covering of manganese and iron oxides.

Other pictures he showed were the burning Wingan Mountain—burning for many hundreds of years; also the entrance to the harbour of Cooktown, with numerous sandbars; tropical plants such as a ficus with a huge buttress base; a strangler fig near the Endeavour River; bulbous "ants plants", containing ants which live in a network of channels made by borers; a water-lily lagoon and epiphytic orchids *Dendrobium canaliculi* and a *Cymbidium* species.

Miss Pat Carolan showed remarkable pictures taken from a light aircraft of Carnarvon, Marble Bar, Wittenoom and the Gascoyne River from the sandy bed of which water is pumped, producing $2,000,000 worth of products. Other pictures showed well vegetated sand ridges; the plateau of Kennedy Range with sand dunes on top; stream patterns; Mt. Augustus, the valley of the Fortescue River with no vegetation; over the Hammersley Range and Wittenoom with gorges about 800 ft. deep capped by red iron ore over bluish asbestos.

Miss Jean Blackburn showed a picture of Sealers' Cove at Wilson's Promontory, taken from Mt. Ramsay, a tree fern with six roots of plants which had germinated on top of it, growing to earth. There was also a picture of a very large sunray starfish at Sealers' Cove. Another picture showed a group of large grass trees and younger ones developing on a farm 15 miles east of Heathcote. A quaint picture of a rock like the profile of a witch with the sunset behind was taken near Maldon.

Mr. Eyre Swarbrek explained the pollination of a tongue orchid *Cryptostylis subulata* as described by Mrs. E. Coleman many years ago and his own experiments at his home with the small tongue orchid *Coleptochila* and ichneumon wasps that located it. Colour slides of the orchid, the wasps in the act of pollinating it and pollinia adhering to the abdomen of the wasps were shown. Miss M. Elder showed colour slides of Roma Gorge, west of Glen Helen in Central Australia, a canyon near Wilpena Pound in the Flinders Range and Chambers Gorge in each of which ancient aboriginal petroglyphs, produced by the method of chipping die rock or pecking it. Some of these represented circles. Miss Jean Woollard showed colour slides of Mallacoota—the inlet and entrance, the caravan park with trees, the Howe Range and Cape Howe in the distance. She related the story of the grounding of a ship in the 1850's near Cape Howe and the loss of several women and children. The men escaped. After this the Gabo Island lighthouse was put up.

Mr. D. Lee showed an ornamental "power tool" made by aborigines out of bottle glass from telegraph pole insulators, illustrating good craftsmanship.

He related the relative simplicity of aboriginal tools to the environment, which unlike many North American and European situations is relatively warm—drought rather than cold being the chief Australian problems.

Australian animals have thinner skins than those in North America. The North American Indian tool is firmer, either for use on an arrow or a lance to penetrate skins. In Australia it was not necessary to make bone needles as there was no need for clothes. He showed a North American Indian tool and a pipe, also a "tool" to loosen tongues to speak. A scraper stone is a simple tool to whittle wood. Until the aboriginal artifacts were understood, a lot of evidence on the making of stone implements in Europe was overlooked. Mr. E. Allan showed colour slides of petroglyphs from Bijer Kerno Station near the Broken Hill area and compared them with different kinds in the Mootwingee Side. He also showed the Snake Cave, paintings and hand stencils, so different from the peckings of the petroglyphs.

A pile of sandstone shown was believed by the recently appointed ranger, who has lived all his life in the area, to be a place where aborigines burned desiccated bodies. Pools of clean water were shown in the Mootwingee reserve from which stock is now excluded.

Mr. North showed a slide of exceptionally large hailstones, clear around the edge and opaque in the centre, which fell on Dec. 25th, 1966. Another slide he showed was a handsome specimen of *Correa reflexa* (red variety) from five miles south of Traralgon.

Exhibits included the ichneumon wasps *Lissopimpla semipunctata* set in plastic by Mr. E. Swarbreck (described above). Mr. J. R. Garnet brought silicified wood from petrified forests of Queensland near Roma which have been exposed by the removal of coal for Japan. He also showed some very large fossils (including an Ammonite) from along the road between Hughenden and Muttaburra—the scene of a former inland sea which was covered with a lava flow which weathered away exposing bulges of fossiliferous sandstone.

The secretary announced that Mr. Graham Pizzey would give an illustrated lecture on "Australian Wild Life" in the University High School Assembly Hall on March 5th (Tuesday) at 8 p.m. and at Ringwood Hall on March 6. He also read a letter asking for information on how to grow the parasitic fungus that destroys flies.

The secretary said that Graham Pizzey had put forward the idea that the greater part of Pt. Nepean should be reserved for a National Park in honour of Mr. Holt. Mr. J. Baines said the matter would be for the new Prime Minister and Cabinet to decide as it is Commonwealth property.

The secretary announced that he had a letter from Mr. Gilbert P. Whitley, to whom the Natural History Medallion (1966) had been awarded. He said he would be pleased to come to Melbourne to give a talk when a date was fixed.

The names of the present office bearers were written on a board and nominations were called for. So far the nominations are us under:

President, Mr. E. R. Allan; Vice-presidents, Mr. T. Sault, Mr. F. L. Jeffs; Secretary, Mr. D. Lee; Ass. Secretary, Mr. R. Condron; Treasurer, Mr. D. E. McInnes; Editor, Mr. G. Ward; Ass. Editor; Librarian, Mr. P. Kelly; Ass. Librarian, Miss M. J. Lester; Excursion Secretary, Miss M. Allender; Council: Mr. J. R. Garnet, H. Lewis, A. J. Fairhall, B. Fuhrer, I. Morrison.

Tribute to F. B. (Ben) Tindale

Every now and again it was my pleasure to visit Mr. Fredric Bendjamin Tindale of Yarra Junction. "Ben" was a keen naturalist and specialized in diatoms and foraminifera. He did much work for the Melbourne museum.

It was with great sorrow that during my last visit I learned that Ben had passed away. He died on the 6th July 1967 and was cremated at Springvale crematorium. As a keen member of our Microscope group he was unable to attend in later years because of the great distance and his eyes were not the best. Ben died in his 77th year.

KENNETH TROTTER

(Microscope Society of Victoria)

Botany Group Meeting
14th December, 1967

Twenty-two members attended, with Mr. Bruce Fuhrer in the chair. The evening took the form of a Members' Night. Mr. Fuhrer displayed dried specimens of rushes, sedges and grasses, collected by him over a number of years. After he had commented on the named species, the exhibits were inspected by members.

Mr. Karl Kleinecke showed colour slides of wildflowers of Wilson's Promontory, then Mr. Alan Morrison projected his of alpine flora, chiefly from the Victorian Alps. Mr. Rex Filson with his slides contrasted Christmas as celebrated in Alice Springs, Central Australia (wildflowers, camels and all!) and at Mawson, Antarctica (including party caps and festive fare!). (Rex lived at both these places for some time; his finely illustrated book, "Lichens and Mosses of Mac.Robertson Land", is a permanent and scholarly record of his botanical researches there.)

Mrs. Ercil Webb-Ware showed slides of wildflowers and habitats in various parts of Victoria. Supper was then enjoyed by all present.

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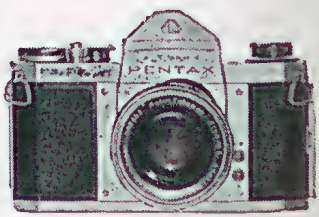

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F.N.C.V. DIARY OF COMING EVENTS

GENERAL MEETINGS

Monday, 12 February—At National Herbarium, The Domain, South Yarra. Commencing at 8 p.m.

1. Minutes, Reports, Announcements.
2. Correspondence.
3. Subject for the evening—"Down the Darling": Miss Helen Aston.
4. Election of New Members.

(a) *Ordinary:*
Mr. Ronald E. Healey jnr., 161 Cubitt Street, South Richmond 3121. (Interests—Fauna & Nature Surveys and Ornithology.)
Mr. Douglas J. Western, 141 Rosanna Road, Rosanna 3084. (Interest—Mammals.)
Mr. Raymond B. Silver, 44 Parkhill Road, Kew 3101. (Interest—Microscopes.)
Miss Helen M. Gribble, C/o 13 Diamond Street, Preston 3072. (Interest—Mammals.)

(b) *Country:*
Mr. Donald G. Teese, Moores Road, Monbulk, Vic. (Interests—Mammals, Entomology, Botany.)
Mr. Simon Murray, 27 Corio Ave., Frankston 3199. (Interests—Botany and Aust. Mammals.)
Mr. B. M. Nicholson, McEacharn Street, East Bairnsdale 3875.

5. General Business.
6. Nature Notes and Exhibits.

Wednesday, 13 March—Broken Hill Excursion. (Note that this meeting is on Wednesday.)

Monday, 8 April—"The Realm of Nature" (An ecological study)—Mark Gottsch.

Monday, 13 May—Natural History Medallion Lecture: Mr. Gilbert Whitley.

GROUP MEETINGS

(8 p.m. at National Herbarium unless otherwise stated)

Wednesday, 21 February—Microscopical Group meeting.

Friday, 23 February—Hawthorn Junior F.N.C. meeting in Hawthorn Town Hall at 8 p.m.

Friday, 1 March—Preston Junior F.N.C. meeting in the Rechabite Hall, 251 High Street, Preston (north from Bell Street), at 8 p.m.

Monday, 4 March—Entomology and Marine Biology Group. (This group meets in Mr. J. Strong's rooms at Parliament House at 8 p.m.—enter through private gate at south end of building.)

Wednesday, 6 March—Geology Group.

Thursday, 7 March—Mammal Survey Group. (This group meets in the Library of the Fisheries and Wildlife Dept., Flinders Street extension, at 7.45 p.m.)

Thursday, 14 March—Botany Group Meeting.

F.N.C.V. EXCURSIONS

Sunday, 18 February—Cumberland Falls. Coach leaves Batman Ave. at 9.30 a.m. Fare $2.00. Bring two meals.

12-15 April (Easter Excursion)—Bright. Coach leaves from Flinders Street (near Clark Rubber) at 9.00 a.m. on Good Friday. Accommodation for coach party has been booked at the Oriental Guest House, Bright. Coach returns on Easter Monday. Fare plus accommodation approx. $34.00; deposit $10.00, balance to be paid by March meeting. Cheques to be made payable to Excursion Trust and lodged with Excursion Secretary.

Field Naturalists Club of Victoria

Established 1880

OBJECTS: To stimulate interest in natural history and to preserve and protect Australian fauna and flora.

Patron: His Excellency Major-General Sir Rohan Delacombe, K.B.E., C.B., D.S.O.

Key Office-Bearers, 1967

Acting President:
Mr. E. R. Allan

Vice-Presidents: Mr. A. J. H. Fairhall, Mr. T. Sault

Immediate Past President: Mr. W. L. Williams

Hon. Secretary: Mr. D. Lee, 15 Springvale Road, Springvale (546 7724).

Hon. Treasurer: Mr. D. E. McInnes, 129 Waverley Road, East Malvern, 3145 (211 2427)

Hon. Editor: Mr. G. M. Ward, 54 St. James Road, Heidelberg, 3084.

Hon. Librarian: Mr. P. Kelly, c/o National Herbarium, The Domain, South Yarra, 3141.

Hon. Excursion Secretary: Miss M. Allender, 19 Hawthorn Avenue, Caulfield 3161.

Hon. Sales Officer: Mr. E. R. Allan, c/o National Herbarium, The Domain, South Yarra, 3141.

Group Secretaries:

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Wyperfeld National Park. The track shown is that which was used by bullock teams, travelling between Pine Plains Station in the north of Victoria, and Rainbow. A most pleasant time can always be had now, wandering along this track of the past.

Ostracods from Western District Lakes, Victoria

By Edmund D. Gill
and K. G. McKenzie

Having been asked if ostracods are to be found in the Western District Lakes of Victoria, one of us (E.D.G.) examined the shore of Lake Beeac on 27th April, 1956. The dark grey sediment forming the shore where it is nearest the road was found to contain ostracods, and from the sample collected then, the following forms have now been identified (K. McK.).

	Length
Candonocypris sp.	1.90 mm.
Ilyocypris cf. *australiensis* Sars	1.10
Eucypris sp.	2.03
Cypretta sp.	0.89
Diacypris sp.	0.93

In October 1967, the S.W. shore of Lake Corangamite was examined by E.D.G. where an embayment crosses the North Pomborneit Road. On the east side of the road, the shore was whitish with weed killed by retreat of the lake waters. When the weed was turned over, it pulled up a thin layer of half-dried bottom mud, the surface of which was silvery as though numerous snails had recently crawled across it. Examination of the silvery areas showed that they consisted of thousands of ostracod carapaces. The following forms have been identified (McK.).

	Length
Mytilocypris sp.	3.25 mm.
Platycypris sp.	1.6
Diacypris sp.	1.0
"Strandesia" sp.	0.65

Other forms not identified added to the above make a total ostracod fauna of seven species.

Mytilocypris is large, a poor swimmer, and a crawling form, often associated with weed. It has a wide tolerance of salinity, being found in slightly brackish to highly saline environments. Lake Corangamite is a lake of surface accumulation, and varies greatly in salinity according to the level of the water. As its basin is very shallow and it is very extensive, a small increase in depth means a large increase in volume of water. *Ilyocypris* is usually epibenthic but sometimes endobenthic, and although not an active swimmer, can move efficiently for brief periods. *Platycypris* was first recorded from a saline lake in South Australia. *Diacypris* is the most efficient swimmer of the genera named, and also has a wide salinity tolerance. *"Strandesia"* is found in freshwater to brackish habitats.

It should be noted that all these ostracods were present during the high stand of Lake Corangamite, when the waters were at their freshest. It would be interesting to trace the variations in the ostracod fauna as the lake dries up, and so becomes much more saline. It is probable that all the many and varied lakes of the Western District have ostracod faunas that would repay collection and investigation.

Lepidurus

(The Tadpole Shrimp)

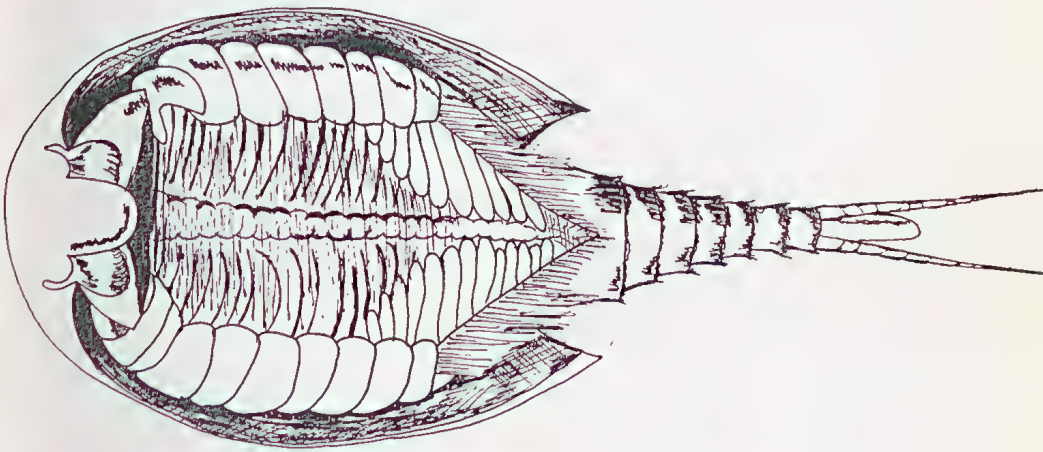
by W. GENERY

The Lepidurus or as it is sometimes called the Tadpole Shrimp is a very rare and extraordinary crustacean. Early naturalists Schoeffer and Latrielle claim that the body of the creature although only about 35 mm. in length, is composed of between 1,780,000 and 2,200,000 parts or articulations.

Crustaceans are a class of the Phylum Arthropoda, and are characterized by the presence of two pairs of antennae. Respiration is accomplished by means of gills, or directly through the body surface. The majority of crustaceans are aquatic and a large number of the species are found in fresh water.

The Lepidurus belongs to the order Notostraca, and has from 40 to 60 pairs of thoracic appendages. The body is depressed and covered with a dorsal shield-like carapace, which is oval shaped and covers the head and thorax. It is rounded anteriorly, and has a large concavity at the posterior extremity, to allow complete movement of the thoracic appendages. In the centre of the carapace there is a slight keel which divides to the right and the left. It is under this keel that the body of the creature is attached to the carapace by a muscle, which extends along the cephalic portion, which is smaller than the thoracic part.

On each side of the thoracic section of the carapace a number of lines may be seen running obliquely in an arched shape. These are the blood vessels according to earlier writers, but present-day naturalists discredit this. However, I maintain the former statement is correct, as when the creature



Lepidurus (Approx. ×4)

dies upon its back a large clot of blood is formed around these vessels, but when it dies upon its ventral surface, no blood clot is to be found because the blood has diffused through the thoracic appendages into the surrounding water.

The two eyes are very large and compound, and they are to be found upon the upper part of the head very close to each other. They are of a reniform or kidney shape, and approach each other at the upper part, whilst lower down and between them is a small whitish elevation. This is a rudimentary eye which is a relic of the nauplius stage in the development of the creature.

Looking at the Lepidurus from underneath we find at the anterior end a small portion of the carapace extending across, and forming a plate, level with the edges of the carapace. Under this plate we see the antennae which are very short and consist of two articulations. Between the antennae is the mouth, which is very complicated and consists of the following parts:

(i) a superior lip, very large and projecting downwards and firmly attached to the plate described above.

(ii) a pair of mandibles which are thick and curved, with a flat edge on which are nine or ten strong teeth.

(iii) an inferior lip consisting of two lobes.

(iv) two pairs of jaws, the first pair made up of two portions which are toothed and ciliated; and the second pair consisting of two portions which are also toothed and heavily ciliated, but which are surmounted with a styliform or bristle-like appendage.

The body of the animal is cylindrical in shape, and consists of about thirty articulations joined together in a manner which permits a large degree of motion. These articulations diminish in size as they reach the posterior portion, and are studded all over with short stout spines. The feet consist of about sixty pairs, and extend from just below the mouth, downwards beyond the carapace. They are very complicated and greatly articulated.

The first pair of feet are shorter than the others and are ramiform. They are composed of a basilar part and several appendages. The base is divided into three parts. The first part has two very long roundish appendages, which are made up of a large number of small articulations; one having about sixty and the other about fifty, with a short body ciliated at its edges. The second joint has one similar roundish appendage, slightly shorter, and consisting of about thirty joints, and is capable of a great degree of motion. The third has a much shorter appendage divided into six joints, and not possessed of any motion. At the end of this joint are two ciliated portions, one roundish and the other oval shaped. These first feet are the animal's principal organs of motion, they are often mistaken for the antennae.

The other pairs of feet are branchial and not used for motion. These feet are shorter and broader and are of a lamellar structure, and gradually become smaller until finally they become rudimentary. As they serve for respiration and not locomotion, their structure is somewhat different from the first pair; but we can still trace a similarity in them all, although they are used for different purposes. The first part of these branchial feet is divided into three joints, one with two long finger shaped portions

which are strongly dented at the edges, and a small one of a similar structure terminated by ciliated edges, and the plate or sac attached to the first joint of the remaining portion.

The eight succeeding pair of feet are much the same as the preceding pair, except that the finger shaped claws become shorter and smaller.

The eleventh pair of feet (which are also the tenth pair of branchial feet), are different from all the others. They are called the "Ovarian Feet", and the base is not seen so clearly, but we find the same number of finger-like claws, and the portions described in the other feet; but these parts become shorter and broader until two have the appearance of circular plates, one being slightly larger than the other. These are attached together by means of a muscle, thus forming a capsule which is not transparent like the other parts, but filled with small round spots; and when these are examined closely, they are seen to be eggs.

This is the reason why the eleventh pair of thoracic appendages are sometimes called the "Ovarian Feet".

The remaining branchial feet are different in that they consist of one joint and the external claw or finger, and are more semi-circular, broader and shorter. Although consisting of the same number of appendages, the branchial plate is rounded and broader, whilst on the edges, instead of fine setae we find about ten plumose setae. As these feet succeed each other they look more like part of the branchial plate, until at last they are merely rudimentary.

The tail consists of one segment which is known as the caudal segment: it is larger and flatter than any of the preceding segments of the body which are cylindrical, and has three projections at its extremity. Two of these are called the cercopods, and each of these consist of four hundred and eighty articulations. Between the cercopods is a flat appendage called the telson, which by either its presence or absence, is often used in the identification of the animal.

The Lepidurus which is sometimes called the "Apus", is found at certain times of the year in temporary pools, but may suddenly disappear from these to be found many miles away in a similar pool, owing to the probability of water birds transporting the eggs. The Lepidurus is never found in a pool which as a clay bottom, or where the water is alkaline: In calm weather it literally swarms around the edges upon the surface whilst on a windy or stormy day it is not to be seen.

When the weather becomes warm or the water becomes alkaline, it can be found dead upon the bottom of the pool. The life span is about four months, and the food consists of small entomostraca and detritus which it brings to the mouth by the unceasing motion of the branchial feet from below the mouth.

I have found the Lepidurus for the past four years in a pool near Lake Colac. This pool is filled by the overflow from a large dam nearby which has a clay bottom, and contains no water weeds. I have found no Lepidurus in it in the four years; whilst the pool literally swarms with them as soon as it is filled up with water. The eggs are said to hatch out in about three weeks, and as the Lepidurus is only alive for about 3 or 4 months, a long period of dessication must take place until the eggs hatch out the following August in the *nauplius* stage. After several ecdyses or changes of skin, the Lepidurus reaches the adult stage. I have not seen a Lepidurus in the *nauplius* stage, nor have

I seen a male among the several hundred specimens I have brought home and kept under observation.

As my observations have extended over four years, I can only assume that the Lepidurus is hermaphroditic; even though early writers Koller and Retzius state that the male exists in the summer brood with its number of females, as in the Cladocera.

In Victoria we have one brood only which exists from August until November, and only time will tell whether owing to an unusual season and early rains, this second and summer brood with its resultant large number of males, is possible—or whether the Lepidurus like the "Fairy Shrimp", is able to reproduce its kind for five succeeding generations after one congress with a male and female. The other possibility is that I am correct in stating that the Lepidurus is an hermaphrodite.

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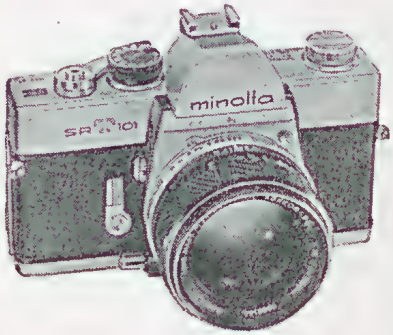

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Book Review

The Wattles of the Australian Capital Territory

by Nancy T. Burbidge

This informative booklet (10″ × 8″), which appeared first in 1961, has just been re-issued and is available from leading bookstores. There are ten pages of text, in which each of the 21 wattles indigenous to the A.C.T. is adequately distinguished. Notes on local distribution and features of interest are also provided, and a simplified key enables easy identification. Smaller type, but without any loss in clarity, has been used for the 1967 edition, and the descriptive text has been completely re-written. The same seven plates of line drawings appear again, but they are now supplemented by full-page photographs featuring 12 of the species concerned—as in Dr. Burbidge's companion volume, Gum Trees of the A.C.T., reviewed in this journal for June 1964. The new acacia book can be confidently recommended to tree and wildflower lovers who visit Canberra or the southern tablelands of New South Wales.

—J. H. W.

F.N.C.V. Publications Available for Purchase

FERNS OF VICTORIA AND TASMANIA, by N. A. Wakefield. The 116 species known and described and illustrated by line drawings, and there are 30 photographs. Price 75c.

VICTORIAN TOADSTOOLS AND MUSHROOMS, by J. H. Willis. This describes 120 toadstool species and many other fungi. There are four coloured plates and 31 other illustrations. New edition. Price 90c.

THE VEGETATION OF WYPERFELD NATIONAL PARK AND A CHECKLIST OF ITS VASCULAR FLORA, by J. Ros Garnet. Coloured frontispiece, 23 half-tones, one hundred line drawings of plants and a map. Price $1.50.

Address orders and enquiries to Sales Officer, F.N.C.V., National Herbarium, South Yarra, Victoria 3141. Payments should include postage (9c on single copy).

Further Descriptions of Victorian Lava Caves

By C. D. Ollier* and
E. B. Joyce†

Plans and descriptions of Victorian lava caves have been published by Gill (1944), Ollier (1963a, 1963b and 1964), Ollier and Brown (1964, 1965), Rees and Gill (1959) and briefly by Skeats and James (1937). We are now able to describe the remaining lava caves, and add more details to some earlier accounts.

1. Insect Cave, Mt. Hamilton

The main cave and Sausage Cave at Mt. Hamilton have been described (Ollier, 1963a). Subsequently a new cave was discovered in the marked depression west-south-west of the entrance to the main cave. Because of the abundance of insect life, especially blowflies, the cave has been named Insect Cave. Its location relative to the other Mt. Hamilton Caves is shown in Figure 1, and a more detailed survey is shown in Figure 2.

The cave has a steep entrance climb, but for the most part is a simple tunnel, with flat floor and somewhat irregular lava walls and roof. The roof comes down in two places, necessitating crawling, and so the cave is divided into chambers, in the manner of Sausage Cave. At the downslope end, the cave opens out into a chamber 24 feet wide and with a height of ten feet. A bench of ropy lava occupies one side. The cave then narrows, and the roof slopes down to meet the floor.

Insect Cave runs downslope from the Mt. Hamilton crater in the same manner as the adjoining caves, but the elevation (Figure 1) shows that it is some 20 feet deeper than the main cave, and at a depth of 39 feet below the edge of the depression.

Victorian lava caves in general have little alluvial fill, but this cave is an exception. The floor is covered by alluvium, with a small-scale braided stream pattern in places. The depression around the entrance acts as a funnel for soil and rainwater. The cave is most notable for its insect life, which in summer at least is prolific.

2. Shallow Cave, Byaduk

A new cave has been found at Byaduk, between Harman Cave and Bridge Cave, as shown in Figure 3. As this cave is nowhere more than three feet below the surface it is named Shallow Cave.

This is the only lava cave so far known which underlies the most surficial flow unit (Plate 1), for most caves are about 15 or 20 feet below the lava surface. The cave is of a very simple shape, as shown in Figure 4. The roof is lined with lava stalactites, and there are many small lava stalagmites on the floor. Lava stalagmites are very rare in Victorian lava caves and their presence in Shallow Cave may result from more rapid cooling than usual, due to the nearness of the surface.

3. Panmure Cave

Panmure Cave has been described by Gill (1944) who also presented a rough plan. A more complete survey is presented here (Figure 5). The description by Gill is substantially

* Earth Science Department, University of Papua and New Guinea.
† Department of Geology, University of Melbourne.

correct, but the fork in the cave is not as symmetrical as in his sketch, and the two branches are not so parallel as to suggest joint control. One passage has a small cross section and is mostly intact; the other is larger and has suffered some rock-fall.

A point of interest is that according to the Colac 1 : 250,000 Geological Map the cave is probably in the lava flow dated by the potassium-argon method as 0·57 ± 0·03 million years (GA 1064, GA 1172, in McDougall, Allsopp and Chamalaun, 1966).

Rees and Gill (1959) considered that both Panmure and Parwan caves were of probable Upper Pliocene age. No specific date can be assigned to the Parwan Cave, but the general order of potassium-argon dates from the Parwan area is 2½ million years, so the Parwan Cave is almost certainly very much older than the Panmure Cave.

4. The Porndon Caves

The caves of Mt. Porndon occur in a basalt disc surrounding and underlying the scoria cones, and have been described by Skeats and James (1937), who show the cave locations, but do not present cave surveys. There are two caves, which have been named Arch Cave (for the entrance arch made by collapse of part of the roof) and Rubbish Cave (for the obvious reason).

Porndon Arch Cave

This is one of the simplest of all lava caves. Almost straight and perfectly tunnel-shaped for most of its length, it has an intact lining on much of its walls, a flat lava floor, and benches along parts of the wall-floor junction (Figure 6).

Skeats and James believed that polygonal jointing of the basalt flow could be seen in cross-section in the

Fig. 1. Plan and pictorial elevation of the Mt. Hamilton lava caves, showing the depression and Insect Cave. (after Ollier, 1963a)

PLATE 1. Entrance to Shallow Cave, Byaduck.

Photo: Authors

cave-roof. This may be true perhaps in a small area near the entrance, but most of the polygonal cracks seen in the cave are in the lining, behind which is normal layered lava (see Ollier, 1965) which does not have the closely spaced polygonal joints typical of dense and uniform basalt.

Porndon Rubbish Cave

Lava caves were originally conduits within "solid" lava through which more liquid lava flowed, and in some instances the contents have done little more than pull away from the roof of the tube they were filling. This is demonstrated to perfection at Porndon Rubbish Cave. At the entrance the floor is slightly convex and cracked, but 18 feet below the roof. Within the cave the roof and floor converge, and gradually the floor's curvature comes to match that of the roof, until they meet at a common boundary, which is the edge of the original lava conduit. This is shown in Figure 7.

The entrance to Porndon Rubbish Cave is a collapse into the cave where it was at its maximum height. A cone of rock debris now runs from the surface to the cave floor, but is almost completely covered with rubbish.

All surveys were made with prismatic compass, reinforced linen tape, and Abney level. Our thanks are due to the owners of the properties on which the caves are found.

REFERENCES

Gill, E. D. (1944). Basalt cave at Panmure, Western Victoria. *Vict. Nat.* **60**: 167-168; **61**: 42.

McDougall, I., Allsopp, H. L., and Chamalaun, F. H. (1966). Isotopic Dating of the Newer Volcanics of Victoria, Australia, and Geomagnetic Polarity Epochs. *J. Geophys. Res.* **71**: 6107-6118.

Ollier, C. D. (1963a). The Mt. Hamilton Lava Caves. *Vict. Nat.* **79**: 331-336.

———— (1963b). The Skipton Lava Caves. *Vict. Nat.* **80**: 181-183.

———— (1964). Caves and Related Features of Mt. Eccles. *Vict. Nat.* **81**: 64-71.

Ollier, C. D., and Brown, M. C. (1964). The Byaduk Lava Caves. *Vict. Nat.* **80**: 279-290.

———— (1965). Lava Caves of Victoria. *Bull. Volcan.* **25**: 1-15.

Rees, D. J., and Gill, E. D. (1959). The Parwan caves, Bacchus Marsh district, Victoria. *Vict. Nat.* **75**: 159-160.

Skeats, E. W., and James, A. V. G. (1937). Basaltic Barriers and other Surface Features of the Newer Basalts of Western Victoria. *Proc. Roy. Soc. Vict.* **49**: 245-278.

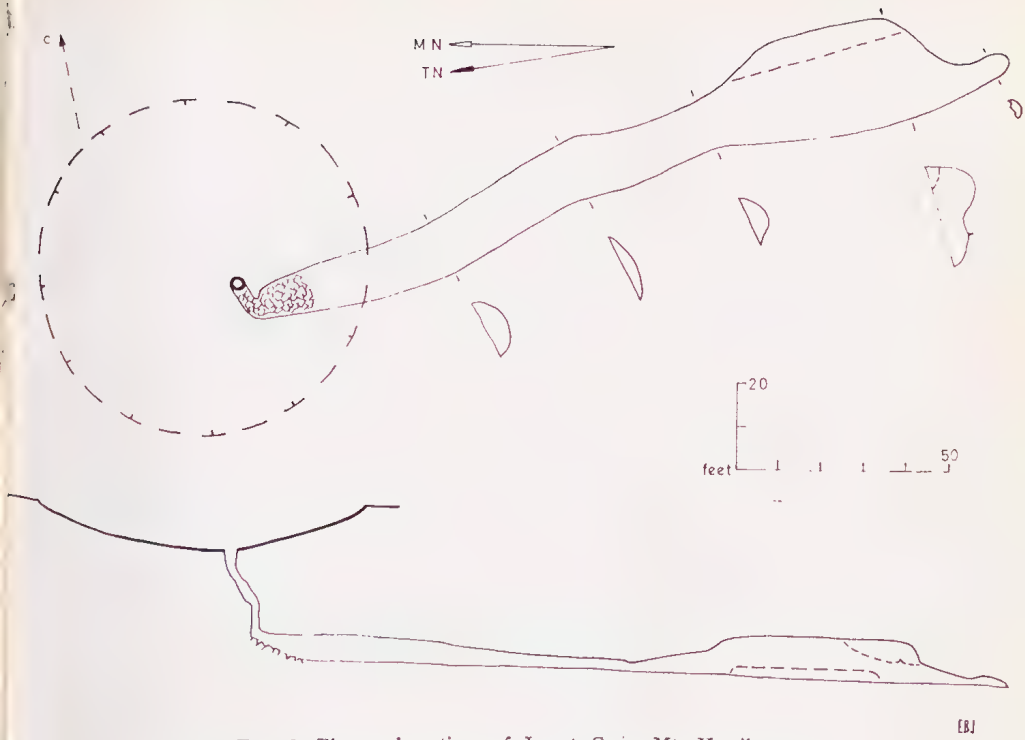

FIG. 2. Plan and sections of Insect Cave, Mt. Hamilton.
Survey by C. D. Ollier and E. B. Joyce. (c—to main cave entrance)

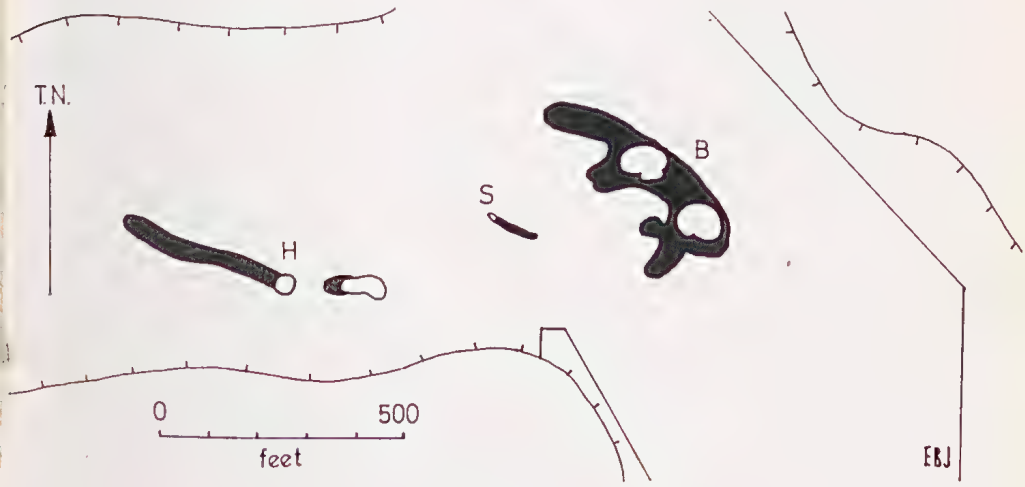

FIG. 3. Location of ShallowCave, Byaduk.
(H—Harman Caves, S—Shallow Cave, B—Bridge Cave) (after Ollier and Brown, 1964)

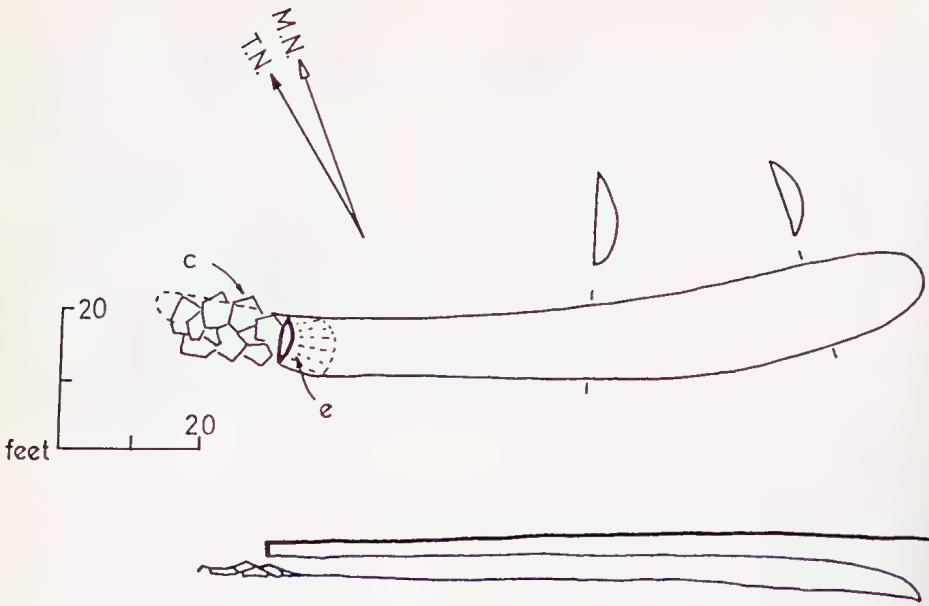

FIG. 4. Plan and sections of Shallow Cave, Byaduk.
Survey by C. D. Ollier and A. M. Richards. (c—collapsed tunnel, e—earth floor)

EBJ

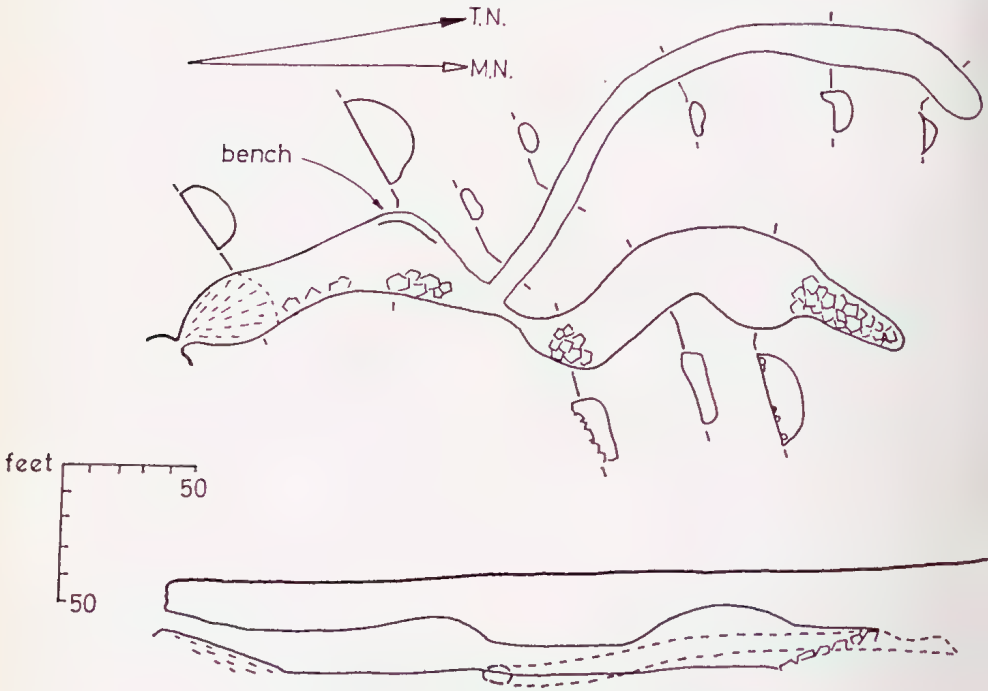

FIG. 5. Plan and sections of Panmure Cave, Panmure.
Survey by C. D. Ollier and M. C. Brown.

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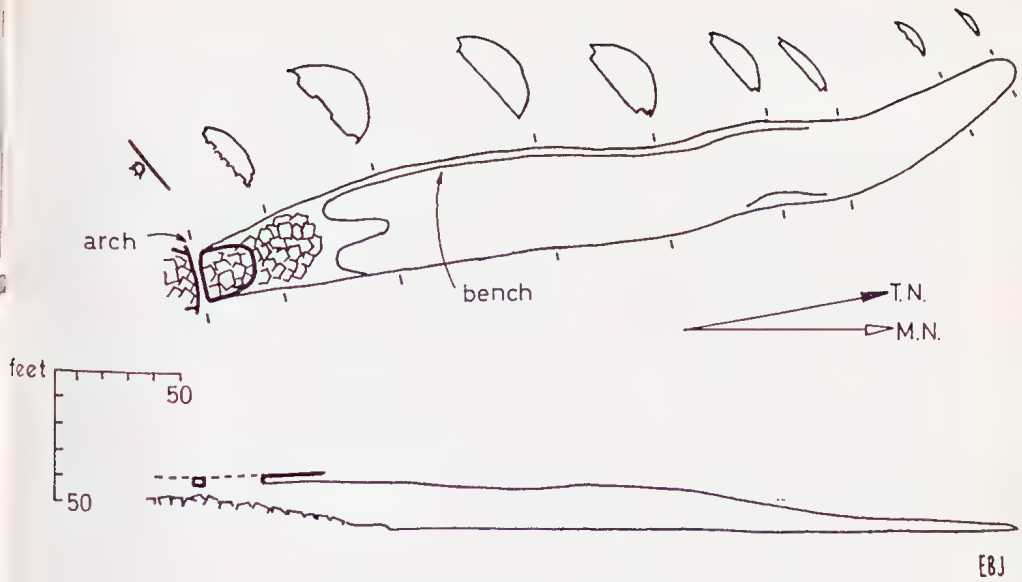


Fig. 6. Plan and sections of Porndon Arch Cave, Mt. Porndon.
Survey by C. D. Ollier and M. C. Brown.

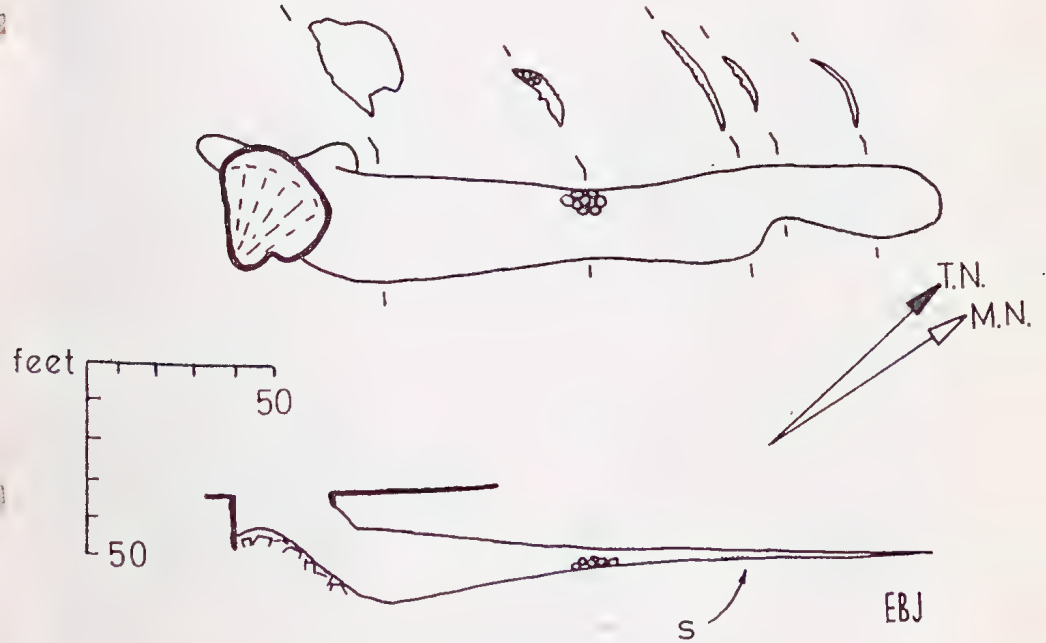


Fig. 7. Plan and sections of Porndon Rubbish Cave, Mt. Porndon.
Survey by C. D. Ollier and M. C. Brown.

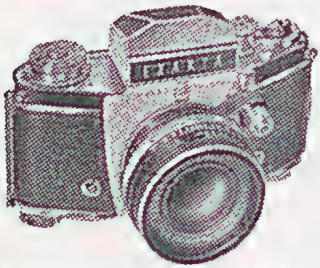
Mammal Survey Group

Mammals of the Metropolitan Area

In addition to the surveys being undertaken further afield, the Mammal Survey Group is commencing a survey of the mammals of the Metropolitan area. This will be based largely on locality records for mammals in the Melbourne suburbs, with attention being directed initially at the two possums common in Melbourne, the ringtail *Pseudocheirus lanuginosus* and the brushtail *Trichosurus vulpecula.*

The group therefore requests all F.N.C.V. members to help. Reports of sighting of either of these possums (or any other non-domestic mammal) would be greatly appreciated in expanding our records. All data will be plotted on a map of the Melbourne area. Specific details of localities are needed, so that they can be pin-pointed in a street directory, with details of date, time of day and surroundings.

Information should be sent to the Hon. Secretary, Mammal Survey Group, 39 Huntingtower Road, Armadale 3143.



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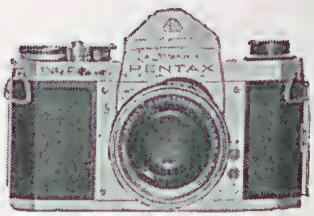

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close to nature

by G. M. WARD

How many of us realize just how close we are to nature; and with what little effort it can be studied?

From the fluttering moth at a lighted window, to the spiders in the darkest corner of our garden shed; the wonders of the natural world are numerous—to the careful and patient observer!

This is a series in which a look is taken at some of these creatures which make up this "world in the garden". The aim is not to provide a completely scientific treatise on each subject; but rather to provide enough general detail to stimulate an interest in the things around us.

If the series encourages us not only to look; but to see something in what we are looking at, then it will have served its purpose.

The past months of dry weather in Melbourne, whilst having drastic effects on the plants and feathered visitors of the gardens, has apparently had little or no effect on the spider community.

In my own garden, and there must be many such, it is frustrating enough having to bucket water in and around shrubbery at twilight, without having to unwind ones-self from clinging spider webs. Initially, I cursed these webs; my irritability no doubt being due to the hot weather. However, eventually I decided that it was far easier to sit and look at these spiders rather than cart water—hence their appearance in these columns.

The group of spiders illustrated all belong to the orb-weaving family (Argiopidae), but one or two show different habits with regard to the symmetry of the orb of web, and to the manner in which they shelter during daylight hours.

One genus, *Araneus*, (Figs. 1, 2) shows a remarkable variation in colour and dorsal pattern. Fig. 1 shows the more common form involving brown, russet, and white colours; while Fig. 2 shows a black form. The latter, rather significantly I thought, rested on the branch of a shrub (*Leptospermum flavescuns*) which was suffering from black sooty mould. The camouflage was perfect.

These two members of the family both constructed their webs during darkness, and removed all but the main construction support between shrubs before dawn.*

The Leaf-curling Spider (Fig. 3) (*Phonognatha wagneri*) is of course well known to most readers. It does not however always use curled leaves for the daytime retreat. I have seen empty snail shells, inverted portions of empty eggshells, and even the plastic cover strips from adhesive finger bandages, neatly curled into a completely weatherproof tube. This species is one that does not spin a symmetrical orb, and always attaches the retreat towards the top of the web. The eggs are also deposited within the leaf.

The other illustrations (Figs. 4, 5) are of the Magnificent Spider, which does not weave an orb at all; and the Enamelled-back Spider which spins an orb with a stabilamentum† above and below the hub. This species has a permanent web and stays at the hub during daylight, with a pair of legs held together in each direction to form a diagonal cross.

The former has a rather crude structure of web, from which are hung elongate silken cocoons containing some hundreds of eggs. Her prey is caught by dangling a slender

* A report of the construction and removal of the web by *A. transmarinus* may be read in the *Vict. Nat.* Vol. 80, p. 371.

† This is a ribbon-like band of web between pairs of radiating spokes of the orb.

thread of silk with a sticky globule at the lower end. This line is flung towards the prey, and the globule provides sufficient weight to carry the thread and to coil it around the victim. The predominant colour of this species is a creamy lemon with faint brown markings on the dorsal surface. Two tubercles are also apparent on the upper surface.

So when next you are feeling despondent and fed up with nightly watering, take a torch and explore the gaps between shrubs. I am sure you will be rewarded by seeing the actions of these spiders of the garden.

Fig. 1. (Nat. Size)

Fig. 3. (Nat. Size)

Fig. 2. (Natural Size)
(*Note:* Due to the flashlighting, the blackness of this spider is not apparent.)

FIG. 4. (×2)

FIG. 5. (×2)

Illustrations by Author

In the *Vict. Nat.* for November 1967, mention was made in these pages of the similarity of *Eristalis tenax* and the Hive bee. Since then I have photographed *E. tenax*, and it appears at the left.

(×3)

Field Naturalists Club of Victoria

News of Former Editor

Mr. J. R. (Dick) Hudson, the former editor of the *Victorian Naturalist*, is for three months assisting with work on bovine diseases, similar to those he was connected with at Parkville in Melbourne. He also holds tutorials with final year students of the Veterinary Faculty of the University of East Africa on two afternoons per week.

He is there for three months, and is taking advantage of this to enjoy bird watching and helping to net and band Yellow Wagtails, which migrate to Europe to breed. Banding started two years ago, and one banded bird has been found in Russia.

Plantations of Eucalypts apparently surround the University.

Our best wishes are extended to both "Dick", and Mrs. Hudson who remained at home in England.

Mr. Hudson's address is—

C/- East Africa Veterinary Research Organization,
Muguga.
P.O. Kabete, Kenya.

New Position in Office Bearers

The position of Subscription Secretary has been created, and subscriptions may now be paid and sent to—

Mrs. N. E. Lewis,
1 Billing Street,
Springvale 3171. Phone 546 4649.

General Meeting—12 February

With approximately 150 members present, the President, Mr. E. R. Allan, welcomed everybody including a special welcome to Mr. Cliff Beauglehole and Miss J. Galbraith.

At the January meeting, Council had approved the minutes of both the extraordinary and general meetings for January, and on a motion from Mr. Swaby, these were taken as read by the meeting.

At this point the President introduced Miss Helen Aston, the guest speaker for the evening, who had prepared a most interesting natural history travelogue of a trip, "Down the Darling", which she and two companions had done in 1966.

They covered just over 2,000 miles in three weeks, and travelled between 300 and 80 miles each day, working on the well-tried system of our bushmen of "camping at the best water-hole after lunch".

The trip started from Mildura and carried on through Pooncarie, Menindee lakes, across to Broken Hill and the old town of Silverton, back to Mootwingee, and via a back route to Kayrunnera and White Cliffs.

From here the route went south to Wilcannia, and followed the Darling River to Bourke. The last part of the official trip brought the party back to Cobar.

Two of the members of the trio were keen bird observers, and the third member, although a layman, kept a most comprehensive set of notes (even though Choughs was entered as "Chuffs", and other understandable mis-spellings occurred. Encounters with beer bottles were even noted).

One hundred and twenty-five species of birds were listed for the trip, including the Chestnut-breasted Quail Thrush, whose known range was extended by some 100 miles further south.

The dry conditions apparently accounted for the lack of any Budgerygahs in the area, and likewise the Chats.

Miss Aston then commented on a series of slides, beginning with some examples of the River Red Gums along the banks of the Darling, which showed the exposed root systems due to the washing away of the soil. Another tree showed the scar where bark had been removed by an Australian of the past, perhaps to make a "cooliman" or similar article.

Other slides showed the conditions brought about by the particularly dry conditions, where sparse specimens of Casuarina trees exhibited the only glimpse of greenery. Birds seen here included Zebra Finches, Major Mitchell Cockatoos, and Little Corellas.

The lakes around Menindee were largely dry, but Lake Weatherall had water in it. Around this area, about 20 Corellas and 100 Pelicans were seen, together with Native Hens, Tree Martins, Wood Swallows and Emus (plus an excellent slide of a footprint of one in the bed of Lake Menindee).

At Broken Hill and Silverton, the Wedgebill and Chestnut-crowned Babbler were identified; and the difference in river systems was apparent, in that the Silverton River (dry) and others of the area had sandy beds with trees growing in them, and were subject to flash floods; while the Darling has deeper banks and is slow to flood. Mulga Parrots and Striped Honeyeaters were seen near Silverton.

Near Mootwingee, aboriginal rock chipping and examples of hand stencils may be seen, and some excellent slides were shown of these, taken in a wind-worn cutting called "Snake Cave". There is no authorative story of these works, but they include representations of men, lizards, kangaroo and emu. Near here were seen the Yellow-throated Miner, Spiny-cheeked Honeyeater, Red-tailed and Chestnut-tailed Thornbills (in same tree), Rufous Whistler, Wedge-tailed Eagle, and Apostle Birds. Among the botanical specimens appeared species of the Callitrus, *Acacia continua, Eremophila duttonii,* and

The next section was across the white gibber country towards White Cliffs, but unfortunately no Gibber Birds were seen. However, the Tobacco bushes in flower attracted the Spiny-cheeked and Yellow-throated Honeyeaters, and also the Blue and White Wren, and White-breasted Wood Swallow were observed.

In the opal country of White Cliffs, so-named because of the heaped-up tailings from the mines, the surrounding area is largely gibber country; but after rain, growth is fairly rapid. The people live in dug-outs which provide coolness during the heat of the day, and are warm enough for the cool nights. The Kestrel and Red-backed Kingfisher were identified here.

From here, the trio went back to the Darling and camped about 17 miles from Wilcannia, where Grey Butcher-birds, Red-tailed Black Cockatoos, and Brown Treecreepers were evident. The empty pupal cases of a species of moth, protruding from the ground surface, were also quite common here.

Towards Bourke, a change came over the whole area. Rain had fallen, and with it came a bloom of green over the whole landscape together with a blossoming of shrubs. Among the birds was one Spotted Bower-bird, the Rufous Song-lark, the Red-capped Robin, and the Hooded Robin.

The trapdoor spider (with the lid to the hole) was common here; and the Bearded Dragon was also seen.

Nearing the final leg of the trip, and to the north of Cobar, the party's first sighting was made of the Chestnut-breasted Quail Thrush. Work is being done at the moment to establish whether there is an overlapping or not of the Chestnut-breasted and Cinnamon Quail Thrush. Also observed here was the Grey-crowned Babbler, Crested Bellbird, White-winged Triller, and Spotted and Owlet Nightjars.

This was the exciting finish to what must have been a most memorable trip and what was certainly a most interesting evening; and due thanks were given both by the President and the members present.

Correspondence was received from a member who commented upon the numbers of Brushtail and Ringtail Possums to be seen in the Toorak to Burwood areas. He also mentioned the rabbit and its adaptability to conditions, and quoted the instance of having seen a rabbit during a drought period, dive underwater to retrieve "greens" from beneath the surface.

Mr. Dewar Goode also wrote of the desirability of the forming of a North-east F.N.C. with surrounding branches such as the Buckland Valley and Ovens Valley. He also stressed the need for a National Park in the area bounded by Wangaratta, Benalla, Beechworth and Harrietville. The suggestion was made

that the F.N.C.V. members meet representatives of the area mentioned, during the April excursion to Bright.

In General Business, Mr. Woollard suggested that Council investigate the possibility of obtaining a more efficient public address system for use at general meetings.

The exhibits on display included the stuffed specimens for comparison of the Buff-tailed and Yellow-tailed Thornbill, kindly loaned by the National Museum and brought by Mr. E. R. Allan; a specimen of both the common hive-been and the introduced Drone-fly (*Eristalis tenax*) to show their similarity in appearance. (Some controvery occurred at a recent meeting as to whether in fact the two were similar, and the exhibit was to help members reach their own conclusion.)

Mr. Swaby suggested that exhibits were not prepared sufficiently to enable new members to identify or gain knowledge of a specimen, and he illustrated his point with very well labelled exhibits of *Balledíera longiflora, Treghemopany sambuafolius, Solanum aviculare, Dianalla tasmanica,* and *Callocephalus brownii.*

A beautifully cleaned skeleton of the Shingle-back or Stumpy-tailed Lizard, prepared by Jenny Forse, showed each feature most clearly.

Mr. Curlis gave concise details of his method of striking the seeds of Sturt's Desert Pea. He has had a great measure of success with the method, and it is hoped that details will be published in the *Victorian Naturalist.*

New members, whose names appeared in the *Naturalist,* were duly elected.

Geology Report—7th February

Thirty members and visitors attended with Mr. Davidson occupying the Chair. The subject for the evening was "Holiday Reminiscences". Members gave accounts of their activities over the holiday period, and slides were shown of interesting localities visited. Contributors of slides were—

Mrs. Costermans—Views of the Tower Hill Caldera and the Tuff beds around its perimeter, and also craters and scoria cones within the caldera.

Mr. Taylor—View from the air of lateral folding of strata on the border of Pakistan and Afghanistan; views of the Tasman Glacier at Mt. Cook, N.Z.; and a slide of an unusual granite formation near Cooktown, Qld.

Mr. Sault—Slides of Tower Hill, Crater at Blue Lake, Mt. Gambier, and a Basalt Quarry at Portland, a little more than a chain from the ocean, and 95 ft below sea level. Historic buildings in Portland, built of local stone, were also shown.

Exhibits

Mr. Davidson—Microline (var. Amazonite), Orthoclase Crystal, Philip Is.; Soda Orthoclase, Mt. Anakie; Anorthoclase, Mt. Franklin, Daylesford; Orthoclase Crystals, Flinders Is.; Green Feldspar, Amazonstone, Broken Hill.

Mr. Francis—Common Opal, Yinnar; Crinoidal Limestone, Toongabbie; Fossil Leaves and Insect (Lower Cret.), Koonwarra.

Mr. Bairstowe—Malachite, Kaolin, Talc, Ilmenite, Sulphur, Sinai UAR; Barytes and Copper, Mycanos Is. Greece; Marble pebbles, Paros Is., Greece; Emery, Naxos Is., Greece; Meerschaum, Eskisehir Turkey; Turquoise, Nishapur Iran; Alabaster, Egypt.

Mr. Sault—Slide of Micro-fossils under Microscope, Fossil beach, Mornington.

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F.N.C.V. DIARY O FCOMING EVENTS

GENERAL MEETINGS

Wednesday, 13 March—At National Herbarium, The Domain, South Yarra, commencing at 8 p.m.

1. Minutes, Reports, Announcements.
2. Correspondence.
3. Subject for the evening—"Broken Hill Excursion".
4. Election of New Members.

(a) *Ordinary:*
Dr. G. J. Bishop, 45 Dendy Street, Brighton 3168.
Mr. R. G. Edwards, 6 Miller Crescent, Mt. Waverley 3149.
Miss N. G. Taylor, Flat 4, Erna Court, 181 Riversdale Road, Hawthorn 3122.
Joint: Mr. C. H. and Mrs. N. Campbell, 354 Burke Road, Glen Iris 3146. (Interest—Birds).
Miss A. and Mr. S. Richards, 8 Miller Street, Sandringham 3191. (Interest—Marine Biology).

(b) *Country:*
Mr. D. Reeves, Riddells Creek 3431.
Mr. A. B. Peisley, Genoa 3888, via Orbost, Vic. (Interests—Botany, Shrubs, Trees, Orchids).
Joint: Mr. G. and Mrs. M. Douglas, "Knotanoll", Riddells Creek 3431. (Interest—Mammal Survey Group).

5. General Business.
6. Nature Notes and Exhibits.

Monday, 8 April—Annual Meeting at 8.00 p.m.

Subject for the Evening—"The Realm of Nature" (an ecological study)—Mark Gottsch.

GROUP MEETINGS

(8 p.m. at National Herbarium unless otherwise stated)

Thursday, 14 March—Botany Group.

Wednesday, 20 March—Microscopical Group.

Friday, 29 March—Junior meeting at 8 p.m. at Hawthorn Town Hall.

Monday, 1 April—Entomology and Marine Biology Group. This group meet in Mr. Strong's rooms at Parliament House at 8 p.m. Enter through private entrance at south end of house.

Wednesday, 3 April—Geology Group.

Friday, 5 April—Junior meeting at Rechabite Hall, 251 High Street, Preston (north from Bell Street) at 8 p.m.

F.N.C.V. EXCURSIONS

Sunday, 17 March—Riddell district. Leaders: Mr. Douglas and Mr. Reeves. The coach will leave Batman Avenue at 9.30 a.m. Fare $1.50. Bring two meals.

12-15 April (Easter Excursion)—Bright. Coach leaves from Flinders Street (near Clark Rubber) at 9.00 a.m. on Good Friday. Accommodation for coach party has been booked at the Oriental Guest House, Bright. Coach returns on Easter Monday. Fare plus accommodation approx. $34.00; deposit $10.00, balance to be paid by March meeting. Cheques to be made payable to Excursion Trust and lodged with Excursion Secretary. Bring a picnic lunch on Good Friday.

Field Naturalists Club of Victoria

Established 1880

OBJECTS: To stimulate interest in natural history and to preserve and protect Australian fauna and flora.

Patron: His Excellency Major-General Sir Rohan Delacombe, K.B.E., C.B., D.S.O.

Key Office-Bearers, 1968

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Immediate Past President: Mr. W. L. Williams

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Hon. Treasurer: Mr. D. E. McInnes, 129 Waverley Road, East Malvern, 3145 (211 2427)

Hon. Editor: Mr. G. M. Ward, 54 St. James Road, Heidelberg, 3084.

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Hon. Excursion Secretary: Miss M. Allender, 19 Hawthorn Avenue, Caulfield 3161.

Hon. Sales Officer: Mr. E. R. Allan, c/o National Herbarium, The Domain, South Yarra, 3141.

Subscription Secretary: Mrs. N. E. Lewis, 1 Billing Street, Springvale 3171. (546 4649).)

Group Secretaries:

Botany: Mr. K. Kleinecke, 8 Oliver Street, Ashburton 3147 (25 2415).

Geology: Mr. T. Sault.

Microscopical: Mr. M. H. Meyer, 36 Milroy Street, East Brighton (96 3268).

Mammal Survey: Mrs. R. Frankenberg, 39 Huntingtower Road, Armadale 3143.

Entomology and Marine Biology: Mr. J. W. H. Strong, Legislative Council, Parliament House. Melbourne, 3002.

MEMBERSHIP

Membership of the F.N.C.V. is open to any person interested in natural history. The *Victorian Naturalist* is distributed free to all members, the club's reference and lending library is available, and other activities are indicated in reports set out in the several preceding pages of this magazine.

New Rates of Subscriptions for 1968

Ordinary Members	$7.00
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Junior Members receiving **Vict. Nat.**	$4.00
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Life Membership (reducing after 20 years)	$140.00

The cost of individual copies of the **Vict. Nat.** will be 45 cents.

All subscriptions should be made payable to the Field Naturalists Club of Victoria, and posted to Mr. D. McInnes, 129 Waverly Road, East Malvern 3145.

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the VICTORIAN NATURALIST

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Editor: G. M. Ward
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Vol. 85, No. 4 4 April, 1968

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Front Cover:

This photograph of the Banded Plover's "nest" and eggs was taken by the editor during a trip to Wyperfeld National Park in September of 1967. The nesting site was in the centre of a wind-blown saucer shaped sand dune near Black Flat. The effect of a passing shower of rain may be seen from the spattering of the grains of sand.

Readers' Nature Notes and Queries

These columns are available for all members, young and old, to bring before others their own observations in nature. Correspondence may be sent to the Editor, 54 St. James Road, Heidelberg.

Swallows and Contemporary Buildings

From Mr. A. E. Brookes come these observations of last year. It will be interesting to see if they are repeated this year.

Last year, Welcome Swallows in the Greensborough-Macleod area, to be counted by the thousand, discovered that the newer type of L.T.C. school buildings provided excellent roosting places when they were gathering ready to migrate.

Towards the end of April the Swallows began to appear in large numbers each evening at dusk. At one moment there would not be a bird to be seen, but within five minutes the sky would be full of these birds in rapid flight while many others would already be settling on their perching places. For example, on April 26, at 5.25 p.m. there were no Swallows to be seen, but at 5.30 p.m. they were arriving in large numbers.

It was on the long horizontal ledges above the windows, which are sheltered by the eaves, that the Swallows settled for the night. Some of the estimates of the total number were as high as 5,000. It was, in fact, difficult to make an accurate account as many birds could have been seen only by climbing on the roof and this would have been rather hazardous at night. However, there could not have been less than 1,000 and the total was probably nearer to 2,000.

On May 9 the Swallows appeared as usual, their numbers apparently having been increased evening by evening. On May 10 at the expected time there was a strange silence and not a single Swallow appeared, nor have they appeared at any time since then.

The gathering and disappearance of the Swallows was a wonderful sight for nature lovers, but the cleaning staff could hardly be expected to echo the same enthusiasm. In fact, the Swallows presented a considerable problem for the authorities responsible for the buildings, but it is to the credit of the Fisheries and Wildlife Department that they vetoed, on the grounds of cruelty, the use of certain methods which were suggested to discourage the Swallows.

At one school the ledges where the Swallows roosted were altered at considerable expense to make the slope too steep for the birds, but they only moved to another school and so far they have had the last say.

It seems probable that the Swallows have been gathering each year in the same area for a very long time and it is interesting to speculate where they roosted before there were any suitable buildings available.

While the Billy Boiled

From Mr. W. Perry of Eaglehawk, near Bendigo in Victoria, come these accounts of small, but none-the-less interesting events, occurring all the while if we only take the time to look.

The last Friday of August was windy and cold. For some hours my wife and I had been exploring a Whipstick gully where we had found a fine stand of Whipstick Leper Acacia (*A. ausfeldii*). On the journey home we halted near Flagstaff Hill to boil the billy.

Here, the gravelled road, edged with red clay, winds like a narrow ribbon through the dense mallee scrub. In a deep eroded roadside depression we lit the fire, sat with our backs to the sun and waited while the billy boiled.

At first, except for the crackling fire, there was silence. Soon the calls of Crested Bell-birds (*Oreoica gutturalis*), some near and some afar, drifted through the bush. It was difficult to pin-point their location but the variation in the pitch of their songs indicated that a number of birds were about.

There was movement among the Broom Honey-myrtles (*Melaleuca uncinata*) and Green Mallees (*Eucalyptus viridis*) in front of us as a pair of White-eared Honeyeaters (*Meliphaga leucotis*) revealed themselves, calling as they quickly disappeared in the undergrowth. A small party of Spotted Pardalotes

(*Pardalotus punctatus*) silently busy, searched for food in the foliage of a Green Mallee. These small but beautiful birds appeared entirely fearless or perhaps were so deeply engrossed in feeding that we remained unnoticed.

Steam puffed from under the billy lid and the fire hissed as boiling water quenched hot ashes. Disturbing the serenity for a moment, I made the tea, filled the cups and resumed my Buddha-like posture.

Glancing downwards, my wife noticed Grub. Let me explain—Grub was a looper caterpillar of unknown species travelling across the depression by a most complicated mode of locomotion. This looper, little more than one inch long, was grey—almost a replica of small pieces of dry sticks on the ground. Had he kept still, his presence would have remained undetected. Grub, however, was on the move. He appeared to grasp the ground with his front legs, then curved his back upwards until he looked like an expansion bend in a steam pipe. In this position, the hind end of the body was close to the front, when the rear claspers gripped the earth. Then the front legs loosened their grip, and the body straightened out, pushing the head forward. Each contortion moved the caterpillar about half an inch, and as the depression was approximately two feet wide, Grub bent double some fifty times before reaching the other side.

On the ground near my hand, a small blob moved slowly along and I carefully captured this tiny animal in a glass tube. I identified it as an immature male Mallee Mouse-spider (*Missulena occatoria*), one of our most colourful spiders with bright red cephalothorax and steel-blue abdomen. This little spider was lacking half one one back leg.

Scattered on the red clay, thin pieces of slate, some brown, yellow or grey, and of various shapes and sizes formed a crude mosaic. From beneath one small piece roughly an inch square, something small and black emerged and withdrew several times. On shifting the stone, a small depression lined with silk was revealed, inhabited by a black spider no more than one eighth of an inch in length. The abdomen was decorated with tiny white spots and I thought this spider may have been a species of Storena.

Grub, now on the far side of the depression, was having trouble attempting to climb a twelve inch perpendicular cliff. Standing erect, his head swayed back and forth and from side to side as though he was searching for a firm foot-hold, but without success. Moving along the foot of the cliff, he made contact with a thin stick leaning against this wall of clay and quickly looped upwards. The stick barely reached the top and again the caterpillar reared himself, weaving his head about, probing for a firm grip. He failed and suddenly crashed to the bottom. Without hesitation he climbed up the stick again, and this time gained the top. Soon Grub was indiscernable among the litter of dry leaves and sticks.

The sinking sun lengthened the shadows, and the wind, channelled along the road by continuous walls of scrub, was cold. We prepared to leave, pausing for a moment to admire the Golden Wattles in a nearby gully, their blooms still aglow in the waning light.

We packed the black billy in the boot, and started homeward.

Lysterfield Reservoir

Mr. Victor Jacobs continues with his second trip to this area. . . .

Not having circled the dam on my first visit (*Vict. Nat.* 85, p. 48), I approached it two weeks later, this time from the north end. It was not the best of days, with an overcast sky, strong north-west wind, and frequent showers. The environs of the lake were squelchy, and the River Red Gums in this zone were unhappy looking specimens. The higher, drier belt of Mahogany Gums looked as if they had more of a future. Here there was much white heath and on the firebreak, young plants of *Drosera auriculata* were plentiful. Gorse was in flower, as was the Prickly Moses Wattle. In this leafy area we noted Grey Fantails, Brown Thornbills, some Yellow Robins, and a flock of Crimson Rosellas.

We approached the lake to find a bulldozed area being colonized by Spanish Heath, some plants of which were four feet high. Spent shotgun cartridges and dog's faeces indicated that the birds were not safe even here. As we came into this open area, a Black Swan, ten Coots, and a Crested Grebe made for open water. Later, a Swamp Hen flew towards the shore, its orange beak distinctive.

We squelched away from the waterside, and in the thick *Melaleuca* scrub lost our way once or twice, before gaining

a fairly dry track which led to the road at the eastern side. Here on the track was a number of shallow pools, each with its complement of tadpoles. The tadpoles were quite small, but then so were the pools, and I was reminded of a similar set of circumstances in North Africa.

This was in the paved courtyard of the captured Italian barracks at Benghazi which the R.A.F. had occupied when the Axis forces had finally been cleared from the area in late 1942. The pool was most likely formed because of a blocked drain and the frogs took advantage of this to lay their eggs. I watched the developing tadpoles with some interest, especially when the hot spring sun caused the pool to shrink and they had only grown one pair of legs. By the time that the youngsters' four legs had grown, the water had diminished so that the animal life was a shimmering mass of black with no clear water visible. Two days later after duty we paid our usual call to find a pile of dead tadpoles. The sun had evaporated the water, and the tadpoles had lost their race against time. I learnt that North African frogs were not able to gauge the evaporation rate of a body of water; and from the look of the pools at Lysterfield, Victorian frogs were similarly inept.

Friendly Rock Wallabies

These interesting notes are from Mr. A. G. Fellows of Alabama Hill, Charters Towers, North Queensland.

Over a period of twelve months we have won the trust of over thirty rock-wallabies that, instead of stampeding up our rocky hillside as once they did, now sit near our tool-shed door both in the early morning and late evening; or if not in sight, come bounding down just touching the rock tips when called by my wife or me as we break up stale bread loaves to throw to them. Soon the majority are sitting up straight, bread in paws, daintily though noisily munching away, heeding us very little, so that we often stand part surrounded by them, watching their antics. Occasional fights and chases occur between some individuals, whilst others make cat-like toilets after eating, and others drink daintily from the enamel water bowl which is often refilled for them.

Some older animals after eating, tend to stay aloof from the more active ones, and certain flattish rocks that catch the morning sun are preferred by them to doze upon.

Such animals tend to use such places each day until the increasing heat sends them for shelter up the hillside. One old female used an old tree stump in this manner, resenting the presence of any other wallaby nearby.

Several scrubby trees exist among the rocky terrain, their foliage and bark being toxic to all animals. These are erroneously called "bottle-trees", since the leaves are somewhat similar in shape to the true bottle-tree. The sap is of a purple colour under a fleshy bark, and was apparently once used here for tanning purposes.

Bees however, find a wonderful source of nectar in the myriad of tiny flowers for a short time each year.

The wallabies usually shun these trees; but one morning, with the sun having just risen, I went to the tool shed to get the usual bread ration for them, when, on looking up the hill I was amazed to see the old "stump-sitter" high up in the fork of a "bottle-tree", with tail fully pendulous.

I always carry my camera at such times, and have obtained some lucky photographs by being so ready.

As I approached, I took a sequence of pictures while the wallaby casually looked my way, then turned, calculated the shortest distance to the ground, leaned forward and dropped squarely onto a roundish rock below.

Just as casually she sat upright facing me, paws together and gave me the chance of one more fine photograph.

Going to within eight feet of her I threw her some bread, and then noticed the others had made a belated appearance. They appeared as non-plussed at the old wallaby's appearance in that tree-fork as I was. After they had gone up the hill, I stood beside the tree, and with upstretched arm I could just reach the tree-fork. Only a few knobby twigs projected from the nearby vertical tree-trunk. A scratch or two on the bark were all the abrasions I could find. No high rock nearby could have provided an opportunity for jumping.

How or why the animal got there, I still cannot fathom. Others have seen the tree and the photographs and are puzzled too.

Incidentally, the old wallaby still uses *her* stump nearby, but no more high-minded exploits have occurred.

The Native Birds of Reservoir and District

By Peter N. Homan*

The bulk of the survey was carried out during 1965 and 1966, but observations during 1967 have been useful in confirming conclusions drawn from sightings during the two previous years.

The district has been divided into six sub-districts. They are:

1. Merri Creek.
2. Edwards Lake-Park.
3. Melbourne and Metropolitan Board of Works Reserve.
4. Darebin Creek.
5. Mont Park.
6. Suburbia.

The total area surveyed covers approximately four to five square miles, and stretches from the flat, grassy areas around Merri Creek to the open forest country near Mont Park. A great number of habitat types are represented and because of this a reasonable variety of birds either inhabit or visit the district.

Although fifty-six native birds have been recorded, introduced species easily dominate the area. The house and tree sparrows, English starling, Indian mynah, and the blackbird are extremely common throughout the district. The skylark and goldfinch dominate the grassy areas to the north. The songthrush, Indian turtle dove and the greenfinch, although not as common as the above species, are plentiful throughout the suburbia.

Three native birds are common throughout the district, and you will note that they are not discussed in any detail. They are the white-backed magpie, mudlark and the raven.

1. Merri Creek

The area around Merri Creek is rock-covered grasslands with an abundance of "prickle bush" and the occasional eucalypt. Much of the land has been used for sheep-grazing and the remaining grassy plains will soon be converted to residential or industrial areas.

Despite this, there still remains a considerable amount of thick scrub along the creek, especially on the eastern bank, and this provides the habitat for such birds as the Blue Wren and the Brown Thornbill. Both species have been observed at irregular intervals and have not yet been recorded as breeding in the area.

The Welcome Swallow and the grey-backed colour phase of the Silvereye are common and both are recorded as breeding in the area.

Large rocks and small cliff formations along the creek provide a haven for the house-mouse, which forms the main attraction for the Nankeen Kestrel. The kestrel is a common sight hovering over the rocks and the grassy areas. Many large insects inhabit the grasslands and these also would be a great attraction.

The peregrine Falcon has been seen on several occasions feeding at the creek. The many sparrows and starlings that inhabit the scrub would be its main source of food.

The open areas provide the habitat for the Pipit and the Spur-winged Plover. Although the Pipit is not as common as the plover, it is still plentiful. The last record of a Spur-winged Plover nesting in the area was in 1961. Although the pipit probably breeds in the area, no nest has been found to date.

* 40 Howard Street, Reservoir.

The creek itself obviously must attract a considerable number of water birds. The Coot and Dusky Moorhen are common along the creek where overhanging scrub provides cover.

The White-faced Heron is common.

The Little Pied Cormorant, Brown Bittern and Silvergull are all regular visitors, while the White-necked Heron and the White Ibis make occasional visits.

2. Edwards Lake-Park

Edwards Lake is the major habitat for water birds in the northern suburbs.

The banana-shaped lake covers approximately four to five acres, with a large reed-bed at the north-west corner. Smaller reed-beds are scattered along the western and northern banks, but all have been cleared from the eastern and southern banks.

Until 1962, a very large amount of scrub existed on the western side of the lake. During that year approximately ninety per cent. of the scrub was cleared, and this led to the disappearance of, probably, the Blue Wren, Brown Thornbill, and the White-browed Scrub Wren. Today only a small amount of scrub remains.

Three swamp birds are common at the lake. They are the Coot, Dusky Moorhen, and the Eastern Swamphen. The Coot and the Moorhen breed at the lake, but it is doubtful whether the Swamphen still breeds in the area.

Many water birds visit the lake and the inlet and outlet creek. The Black, Little Black and Little Pied Cormorants, Black Duck, Black Swan, Brown Bittern, Little Grebe, White-faced and White-necked Herons and the Silver Gull are all regular visitors. Visits by the Brown Bittern are becoming less frequent as the remaining scrub along the edges of the lake is cleared. The Crested Grebe and the Spur-winged Plover are occasional visitors, the visits of the Plover depending on the level of the lake.

The Large Egret also visits the lake but at irregular intervals. Egrets were first sighted during last July 1965. From then on till the end of that year, egrets were a common sight, but visits ceased until late 1966, when the bird became a regular visitor again.

The Black-fronted Dotterel and Nankeen Night Heron have been observed on one occasion only. On the 3rd November 1965 a pair of Black-fronted Dotterels were observed on the boat launching ramp. On the 12th November 1966, a single Nankeen Night Heron was observed perched in a dead eucalypt on the western bank.

During spring, the Reed Warbler arrives in great numbers at the lake. The reed-beds come alive with their calls. The species breeds extensively at the lake. The future of this bird at Edwards Lake seems uncertain, as the reeds are continually destroyed.

The trees around the lake provide the habitat for several forest birds. Most of the trees are exotic, but there are enough native trees to support populations of the White-plumed Honeyeater and the Willy Wagtail. Both are common at the lake and both breed there. The Welcome Swallow is common. The Red Wattle Bird is also common at the lake for most of the year but does not breed in the area.

The White Cockatoo, Grey Thrush, Grey Fantail, Pallid Cuckoo and the Galah are occasional visitors. The visits of the Grey Fantail would suggest that it inhabits the Merri Creek region, but as yet it has not been observed in that area. The Kookaburra and the Nankeen Kestrel are regular visitors, the former coming from the Board of Works Reserve and the latter from Merri Creek.

Three species have been observed

at the park, each on only one occasion. They are the Golden Whistler, Crimson Rosella and the Eastern Rosella. Because the Crimson Rosella was particularly tame, I feel that it was most likely an aviary escapee.

3. Melbourne and Metropolitan Board of Works Reserve

The reserve, which stretches for almost half a mile, consists of three storage dams surrounded by a considerable number of native and introduced trees.

Although *Pinus radiata* is by far the predominant species, native trees are well represented. There is a magnificent stand of red ironbarks, situated between High Street and the Epping railway line. Most specimens are between fifty and sixty feet high. Other native trees include the candlebark, red river gum, and the golden wattle.

The tall ironbarks provide the habitat for the Red Wattle Bird, which is very common throughout most of the year. The species breeds in the area in large numbers, with many pairs from Edwards Lake-Park adding to the population.

The White-plumed Honeyeater, Welcome Swallow, Kookaburra and the Willy Wagtail are common. The former breeds in the area, but although the latter probably breeds there, no nest has been found to date. The Welcome Swallow and the Kookaburra have not yet been recorded as breeding in the area. The Galah and the White Cockatoo are occasional visitors.

Each spring the Black-faced Cuckoo Shrike arrives in large numbers. The species breeds in the area, and is common throughout the warmer months.

The reserve provides the habitat for the only nocturnal bird recorded for the whole suburb, the Boobook Owl. Mice, rats and probably young possums provide the necessary food for the species.

Three species have been observed at the reserve, each on only one occasion. On the 1st May 1965, a single Peregrine Falcon was seen chasing a flock of approximately twenty little lorikeets. On 26th November, 1966, a single Crimson Rosella was seen feeding in low scrub on the northern side of storage dam number three.

Below storage dam number one there is a shallow pond which receives occasional visits from the White-faced Heron. The Heron has been seen on several occasions perched in the trees surrounding the storage dams.

Because of restrictions, I have been unable to observe any birdlife on the storage dams, but I feel sure that Cormorants would visit the area regularly, to feed on the many fish.

4. Darebin Creek

Much of the virgin bush along the Darebin Creek has been cleared, and replaced with housing projects.

But about half a mile upstream from the Dunne Street bridge is an area of native scrub and eucalypts covering perhaps ten acres. Except for a stand of eucalypts several miles downstream, this is the only area where native plants still exist along the creek, in the Preston-Reservoir area. Although the land is part of the Police Paddock, I feel that it is only a matter of time before all the existing vegetation is cleared.

The thick scrub provides the habitat for three native birds, the Blue Wren, Grey Fantail and the grey-backed colour phase of the Silvereye. The Wren breeds at the creek, but although the Fantail and Silvereye probably breed there, no nest has been found to date. The White-plumed Honeyeater is common and also breeds in the area.

Above the creek and to the north of the scrub are large expanses of grasslands. Two species, the Pipit and Tailor Bird, inhabit the grassy areas, the latter breeding in the area.

The region is quite close to Mont Park and several species which inhabit that area make regular visits to the creek. The Eastern Rosella, Galah, Kookaburra, Welcome Swallow, Nankeen Kestrel, Red Wattle Bird and the Noisy Miner are all regular visitors.

The actual size of Darebin Creek is considerably smaller than that of Merri Creek. Because of its smaller size and the destruction of most of the scrub, Coots and Moorhens no longer inhabit the creek. The White-faced Heron is still a regular visitor.

There are several small patches of reeds situated along the creek, and small flocks of Reed Warblers have been observed at irregular intervals throughout the year.

Three species have been observed in the area, each on only one occasion. They are the Black-faced Cuckoo-shrike, Flame Robin and the Striated Pardalote.

5. Mont Park

This area of half open forest, half farmlands, is probably the most interesting area in the district. The variety of birds ranges through forest inhabitants, birds of prey, and the occasional swamp bird. The parrot family is well represented with five species.

Most of the trees were planted some time ago, but there are a considerable number of large river red gums. More recently, some 20,000 native trees have been planted by La Trobe University and the future of the forest birds seems assured. Unfortunately, the open spaces, which provide the habitat for ibis and herons, is quickly being taken up and the future of these birds seems dim.

Seven species are common in the area. They are the Red Wattle Bird, Noisy Miner, Eastern Rosella, Willy Wagtail, Welcome Swallow, White-plumed Honeyeater and the Musk Lorikeet. The four former species have been recorded as breeding in the area. Several other species inhabit the Park, but are not as common as the previous seven. They are the Grey Butcher Bird, Grey Thrush, Kookaburra and the Red-backed Parrot. A pair of Red-backed Parrots nested in a hollow river red gum during September 1966, and the species is therefore recorded as breeding in the area.

The Galah, White Cockatoo, Nankeen Kestrel and the White-naped

Some of the large eucalypts in Mont Park area.
The marsh mentioned in the text, is in the right background.

Photo: Author

Another section of Mont Park area. Acacias in foreground have been planted by the Authorities of La Trobe University.

Photo: Author

Honeyeater are regular visitors. The Galah has been recorded as breeding in the area. The Golden Whistler has been seen on only one occasion and can be regarded as an occasional visitor.

Probably the most interesting observation for the area was on 22nd September, 1966, when a pair of Little Falcons were found nesting in a large swamp gum. The nesting was successful and the two young were reared.

Situated between La Trobe University and the Rosanna-Kingsbury Road, is a small marsh covering perhaps two acres. It is filled by a number of small drainage streams which flow down from the nearby golf links. The White-faced Heron is a regular visitor to the marsh and also frequents the inlet streams. The Jack Snipe has also been seen on several occasions and the Tailor Bird has been observed on one occasion.

Flocks of White Ibis have been observed feeding on the open grasslands, but this species is not a regular visitor.

6. Suburbia

Different sections of the suburb are well clothed in native trees, while other sections are almost bare. This, of course, depends on past and present plantings by private individuals.

The area between Edwards Lake and the Board of Works Reserve is particularly rich in native trees and shrubs. Mature eucalypts are abundant and these provide a bridge between the two areas. Native wattles, particularly the black wattle, are still quite plentiful in this section of the suburb, while the sugar gum would be the most abundant eucalypt. The candlebark and several native species from interstate are also plentiful.

The area to the east and north of the Board of Works Reserve, although well clothed in several sections, is almost devoid when compared with the area between Edwards Lake and the Reserve.

Overall seven species of native birds are relatively common throughout the housing area. They are the White-backed Magpie, Raven, Mudlark, Welcome Swallow, White-plumed Honeyeater, Red Wattle Bird and the grey-breasted colour phase of the Silvereye. The Nankeen Kestrel is a regular visitor, and has been seen carrying dead mice in talons, on several occasions.

The Peregrine Falcon has been observed on two occasions. On 31st August, 1966, a Falcon was observed for almost fifteen minutes, perched

in a neighbour's eucalypt, as it mutilated a dead white pigeon which was nailed to the branch by the Falcon's talons. On 9th December, 1966, a Peregrine Falcon was seen to chase and catch an escaped white Budgerigar.

The Kookaburra, Black-faced Cuckoo-shrike, Flame Robin, Boobook Owl, Crimson Rosella and Galah are occasional visitors. Three species have been observed each on one occasion only. They are the Grey Fantail, Pallid Cuckoo and Spotted Pardalote.

I feel sure that birds such as the Willy Wagtail and Noisy Miner do visit gardens close to the five areas already mentioned, but I doubt whether visits farther afield are common.

It must be realized that observations of this type can be regular only in the vicinity of one's home, and that regular observations in all sections of the built-up areas are almost impossible.

The following is a list of the native bird species observed during the period September 1964 to December 31st 1966.

1.	Black Cormorant	*Phalacrocorax carbo*
2.	Black Duck	*Anas superciliosa*
3.	Black-faced Cuckoo-Shrike	*Coracina novae-hollandiae*
4.	Black-fronted Dotterel	*Charadrius melanops*
5.	Black Swan	*Cygnus atratus*
6.	Blue Wren	*Malurus cyaneus*
7.	Boobook Owl	*Ninox boobook*
8.	Brown Bittern	*Botaurus poiciloptilus*
9.	Brown Thornbill	*Acanthiza pusilla*
10.	Coot	*Fulica atra*
11.	Crested Grebe	*Podiceps cristatus*
12.	Crimson Rosella	*Platycercus elegans*
13.	Dusky Moorhen	*Gallinula tenebrosa*
14.	Eastern Rosella	*Platycercus eximus*
15.	Eastern Swamphen	*Porphyrio melanotus*
16.	Flame Robin	*Ptroica phoenicea*
17.	Galah	*Kakatoe roseicapilla*
18.	Golden Whistler	*Pachycephala pectoralis*
19.	Grey Butcher Bird	*Cracticus torquatus*
20.	Grey Fantail	*Rhipidura fuliginosa*
21.	Grey Thrush	*Colluricincla harmonica*
22.	Jack Snipe	*Gallinago hardwickii*
23.	Kookaburra	*Dacelo gigas*
24.	Large Egret	*Egretta alba*
25.	Little Black Cormorant	*Phalacrocorax sulcirostris*
26.	Little Falcon	*Falco longipennis*
27.	Little Grebe	*Podiceps ruficollis*
28.	Little Lorikeet	*Glossopsitta pusilla*
29.	Little Pied Cormorant	*Phalacrocorax melanoleucos*

30.	Mudlark	*Grallina cyanoleuca*
31.	Musk Lorikeet	*Glossopsitta concina*
32.	Nankeen Kestrel	*Falco cenchroides*
33.	Nankeen Night Heron	*Nycticorax caledonicus*
34.	Noisy Miner	*Myzantha melanocephala*
35.	Pallid Cuckoo	*Cuculus pallidus*
36.	Peregrine Falcon	*Falco peregrinus*
37.	Pipit	*Anthus australis*
38.	Raven	*Corvus coronoides*
39.	Red-backed Parrot	*Psephotus haematonotus*
40.	Red-Wattle Bird	*Anthochaera carunculata*
41.	Reed Warbler	*Acrocephalus australis*
42.	Silvereye	*Zosterops lateralis*
43.	Silver Gull	*Larus novae-hollandiae*
44.	Spotted Pardalote	*Pardalotus punctatus*
45.	Spur-winged Plover	*Lobibyx novae-hollandiae*
46.	Striated Pardalote	*Pardalotus substriatus*
47.	Tailor Bird	*Cisticola exilis*
48.	Welcome Swallow	*Hirundo neoxena*
49.	White-backed Magpie	*Gymnorhina hypoleuca*
50.	White Cockatoo	*Kakatoe galarita*
51.	White-faced Heron	*Notophoyx novae-hollandiae*
52.	White Ibis	*Threskiornis molucca*
53.	White-naped Honeyeater	*Melithreptus lunatus*
54.	White-necked Heron	*Notophoyx pacifica*
55.	White-plumed Honeyeater	*Meliphaga penicillata*
56.	Willy Wagtail	*Rhipidura leucophrys*

Mammal Survey Group

Mammals of the Metropolitan Area

In addition to the surveys being undertaken further afield, the Mammal Survey Group is commencing a survey of the mammals of the Metropolitan area. This will be based largely on locality records for mammals in the Melbourne suburbs, with attention being directed initially at the two possums common in Melbourne, the ringtail *Pseudocheirus lanuginosus* and the brushtail *Trichosurus vulpecula.*

The group therefore requests all F.N.C.V. members to help. Reports of sighting of either of these possums (or any other non-domestic mammal) would be greatly appreciated in expanding our records. All data will be plotted on a map of the Melbourne area. Specific details of localities are needed, so that they can be pin-pointed in a street directory, with details of date, time of day and surroundings.

Information should be sent to the Hon. Secretary, Mammal Survey Group, 39 Huntingtower Road, Armadale 3143.

Flame Robin *Photo: Author*

Otway's Robins Return

by Trevor Pescott

On the weekend of September 2nd-3rd, 1967, a group of Geelong naturalists camped at the Aire River just south of Beech Forest; a number of birds were recorded during the camp, including the Flame Robin (*Petroica phoenicea*), and because of increased interest in these birds through V.O.R.G.'s Flame Robin Survey, the following notes were made.

The first bird we saw was on Sunday morning (3/9/67) approximately 9.30 a.m.; our attention was drawn to a bird calling from the top of a Redwood (*Sequoia*) above the Aire River bridge. It was a "brown" bird, although under the conditions it was not possible to see if it had any indication of juvenile male plumage.

The bird flew from the Redwood to the top of a bare Poplar and continued singing from this point; both trees were approximatealy seventy feet tall. After about ten minutes, the robin flew further up the river, and although lost from sight, it could still be heard calling at about 10.00 a.m. when we left the area.

With Mr. C. Tingate, I drove back towards Beech Forest, and near the fringe of the plantations flushed a bird from the edge of the road. It was a male Scarlet Robin (*P. multicolor*), and as we watched it, it attacked a male Flame Robin which we had not previously seen.

In the grazing land at Beech Forest township, we found a good number of Flame Robins, both adult-plumaged males and browns. We saw at least six birds on the fences, and there would have been others in the fields.

This suggested to us that the birds had recently arrived in the area, and were probably travelling towards the breeding grounds in the Otways. The fact that there was a substantial flock of birds suggested that the birds were still in wintering condition.

This conflicted somewhat with the solitary calling bird at Aire River which appeared to be establishing a nesting territory.

Although there are many suitable areas in the Otway Ranges for breeding, there are relatively few nests found when a comparison is made with the "high plains" regions above Gippsland. There, nesting is quite intensive. Perhaps the difference in altitude (Otways 2,000 ft., high plains 4,000 ft.) could have some bearing, as could the relative rainfalls.

It is of interest to note that over the previous few weeks, there had been Robins around Geelong, birds re-appearing around the Bellarine Peninsula and adjacent coastline after an absence of about three months.

You Yangs birds generally disappear during the first two weeks of September although no doubt many birds commence movement from mid-August.

Weather conditions—heavy rain in Beech Forest 31 August, 1 September. This cleared, and 3 September was fine, clear and warm.

The Blow at Strathfieldsaye, Gippsland

By Aldo Massola*

The Background

In the year 1842 William O'Dell Raymond took up 64,000 acres of land on the north side of Lake Wellington. This was the whole of the country within a radius of about five miles from where the Stratford Road crosses the Perry River, some two miles north of its junction with the Avon River. However, it was not until 1848 that Raymond moved in with 18,000 sheep and 1,000 head of cattle. That year, having chosen a spot on a rise overlooking Lake Wellington, Raymond commenced building stately Strathfieldsaye Homestead from red gum cut by hand in saw pits on the property, the chimneys being made of bricks baked from lake-side clay. This home, completed in 1879, is in wonderful preservation, and still has the original galvanized iron roofing put on in the 1850's. It has the distinction of being the oldest continually occupied house in Gippsland.

In 1856 Raymond sold out to the Bolden brothers. Then in 1857 legislation was passed which resulted in the subdivision and sale to settlers of much of the Crown land which had been leased by the squatters. Between 1863 and 1867 Bolden was able to buy the freehold of 18 blocks of his former holding, and this much-reduced Strathfieldsaye was sold to W. B. Cunninghame in 1867. In June 1869 Cunninghame sold to William Henderson Disher, who added two blocks to the run. Strathfieldsaye has since remained in the possession of the Disher family.

Today Strathfieldsaye is a picturesque as well as a profitable property of some 6,000 acres. It consists of well-improved pasture lands fringed with natural forested areas which cut off, as it were, this idyllic spot from the noisy outside world. These forested barriers also serve another, and more realistic purpose. The entire property, through the interest and generosity of its present owner, Dr. H. C. Disher, was made a sanctuary for native birds and animals. They find a home and haven in these forested areas and plenty of food in the improved pastures, for Dr. Disher does not begrudge the kangaroos a share of his prize cattle's grass.

The rise upon which the homestead is built, is a continuation of the 50-foot contour which fringes the north shore of Lake Wellington. This contour is actually a consolidated sand-dune marking a former shore line. To the north of the sand-dune the ground is undulating, and mostly timbered, with here and there a marshy depression.

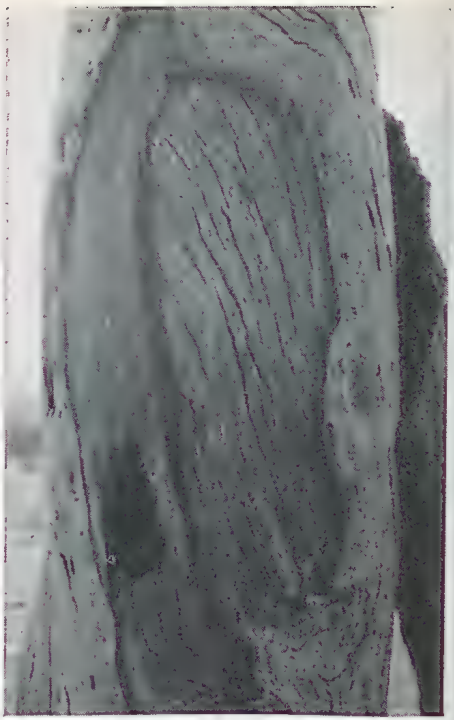
To the south of the sand-dune there is a low-lying plain, about five miles in length, and about one mile across to the present shore-line, which, in contrast with the plain, is swampy, timbered, and covered with tea-tree scrub. The western end of the plain does not terminate abruptly at the old shore line, but rises gradually, culminating in the elevation upon which the homestead is built. On this higher ground many stately and ancient red gums remain to bear mute witness to the past. The plain is, in certain years, turned into a vast swamp. This is when the Avon River is in flood, coupled with abnormally high water levels of the lake, caused by adverse wind conditions. At other times the

* 4/18 Wolseley Street, Mont Albert 3127.

plain is completely dry and bare of trees or scrub, although it supports a luscious growth of grass. The "lagoons" marked upon this plain on the military maps are non-existent, and were possibly residues of a flood at the time the maps were made.

One can envisage this locality as being a favourite resort of the Aborigines. The original squatter, W. O. Raymond, in fact, had installed a cannon, obtained from the wreck of the S.S. "Clonmel" at Port Albert, which he fired at intervals as a "deterrent to marauding blacks". Raymond had been brought up in a military atmosphere, since his father had been a Colonel under the Duke of Wellington; so that the natives probably made a good excuse for his "playing" with the cannon, which, incidentally, is still menacingly pointed towards the lake,

Red-gum showing scar left after removal of bark for a shelter. *Photo:* Author



Red-gum, showing scar left after removal of bark for a shield. *Photo:* Author

fixed on a stump now romantically disguised with ivy.

There are other relics on the property which prove the former presence of the Aborigines. Several of the red gums show the unmistakable marks left by the removal of bark. These marks are of four distinct kinds: (1) The long pointed scars left in removing bark for canoes; (2) the wider, shorter, and square-cut scars left by the removal of sheets of bark for shelters; (3) the smaller oval scars left by removing bark to make shields; and (4) the marks of toe-holds cut in the trees by the hunters when climbing to secure a possum or honey-bag. On Strathfieldsaye there are several magnificent specimens of each of these four varieties, and, fortunately, they are being well protected by Dr. Disher.

However, in spite of the swampy

plains, the cannon, and the scarred trees, it was obvious to me that this was not the place for a large camp of Aborigines. This was because of the lack of permanent water, and because of the nearness, less than a mile west of the homestead, of the Perry and Avon Rivers. These two streams have high banks from which the natives could overlook river flats, swamps, and, of course, permanent water. This would have been the locality for the larger and more permanent camps.

Nevertheless there is a blow on Strathfieldsaye, which Dr. Disher pointed out to me as the place where he had collected a small number of edge-ground axes, chipped-pebble axes, hammer stones, and anvils, six of which he donated to the University of Melbourne.

In answer to my anxious enquiries he assured me that no other implements had been removed from the blow, and that no other person had ever collected upon it. I was therefore enabled to live the dream of every archaeologist and ethnographer: I had been given permission to collect to my heart's content on an Aboriginal camp site, which, with the above mentioned exception, had not been touched by white men, collectors, or otherwise.

The Blow

About one and three-quarters of a mile east from Strathfieldsaye homestead the 50-foot contour, as shown on the military maps, takes a short southerly sweep before continuing in an easterly direction. The point of land thus formed projects into the plain, and from the latter it is seen to be slightly higher than the rest of the contour. Because of this extra height, coupled with the southerly projection, anyone standing upon this point has an uninterrupted view of the whole plain; a fact which would not have escaped the notice of the observant Aborigines.

Dr. Disher informed me that about the year 1946 there was a very windy period, during which time this particular point of the contour began to blow.

At this stage it may be as well to explain the term "blow". The wind occasionally attacks an exposed surface of land. This is when the surface is sandy and bare, or only thinly protected by a covering of grass or scrub, or if it has been disturbed by sheep or wombats or by any other cause. The wind thus obtains a starting point, and the sand is blown away until the more compact subsoil is exposed. In

The "blow" from the edge of the plain, looking towards the timbered country to the north.

Photo: Author.

south-east Australia this wind action is called a blow.

This sandy locality could happen to be one which had been chosen by the aborigines to camp upon. In this case any stone implement or camp refuse left by them, and too heavy for the wind to move, would percolate down to, and finally be left exposed on the surface of the subsoil.

In 1946, the wind at the height of its attack on this particular point, removed sand from it at the rate of a depth of six inches over a surface of 75 feet in 24 hours. Dr. Disher endeavoured to stop this wind erosion by employing all available hands and by building a covering of logs and branches over the entire attacked surface. However, in spite of all his efforts, erosion did not entirely cease for about six weeks, when the wind finally changed. Since then Kikuyu grass has been planted, and other steps taken to prevent a repetition of this mishap; but the present blow is left as a memorial of that battle.

The blow is a horseshoe-shaped depression with a clayey bottom about 12 feet lower than the surrounding consolidated sand surface. It measures about 100 feet north to south by about 300 feet east to west, with the opening of the horseshoe to the east. At the time of my visit a number of broken stones were visible upon the clayey subsoil; and, even at a glance, I could see that amongst them were implements which had been left or lost by the natives. Their presence thus proved, without any doubt, that this point of land had once been an Aboriginal camp site.

The stone debris were not strewn over the entire exposed surface, and formed a greater concentration slightly west of the centre of the blow, with indication that they continued in or under the sand-covered north-west side. At that point, in fact, the wind had commenced to move the sand over an area of about 45 feet in diameter, exposing sand blackened by fire, presumably camp fires. A few stone chips and one Sumatralith made from quartzite were lying half buried in this sand.

Before starting to collect I marked out a 50-foot square, enclosing the larger concentration of stones, and from inside this space I picked up every piece I could see. This was in order to be able to determine the varieties and the proportion of worked implements in relation to the total number of chips and flakes. The results are given in the accompanying table. It is a pity that this was not a large camp, since this is the first table ever made that can be called the complete list of the contents of a camp site, not only in Gippsland, but in south-east Australia. However, it is still important as being a full record of the stone implements used on a hunter's camp in Gippsland.

It is possible that a few of the smaller flakes and implements have sunk out of sight in the clayey soil, since some I picked up were half buried in it. If so, this was probably caused by sheep and cattle walking over them, as a few of their tracks testified; but this could not have been a common occurrence. Kangaroo tracks were also plentiful on the sandy surface around the blow, and late in the afternoon these animals made an appearance. I was concentrating on collecting inside the horseshoe depression when I became aware of them, a breathtaking site of a mob of perhaps 100, large and small, strung out in small groups over a long line. They were on their way from the forested area on the north, over the mile-wide plain, to the scrub-covered shores of the lake. These kangaroos probably cross the plain every

evening to quench their thirst at some water-hole by the lake-side, as generations of their forebears must have done before them.

They had not seen me inside the depression; and it was then that the thought occurred to me that they were the reason for this camp: it was a hunter's camp.

Discussion

The table likewise shows this to have been a hunter's camp. It would appear that a number of suitable stones had, from time to time, been carried by the Aborigines to this spot, and that these served as raw material when an implement was needed. Some of the axes must also have been secreted there, to save carrying them to and from.

The most obvious of the larger implements found are, of course, the axes. These are of three kinds, of which one, the edge-ground greenstone axe, was no doubt obtained as a completed product either from the Western Port or the Howqua River tribes. The other two kinds were locally made from flat water-worn pebbles: the chipped-pebble axes trimmed on both faces along one end to produce a cutting edge; and the Sumatraliths with the crust of one face entirely removed by flaking, so as to form a cutting edge all along the periphery. Both these types were probably used by the hunters for cutting toe-holds in the trees when climbing them to secure possums or honey bags; or for detaching canoes with which to hunt water birds when the plain was inundated. As already stated there are several trees on Strathfieldsaye which plainly show scars.

	Greenstone (Diabase)	Sand stone	Fine-grained quartzite	Coarse-grained qu artzite	Jasper	Flint	Quartz	Limestone	Breccia	Chert	Total
Large broken stones	—	—	7	10	13	—	13	—	—	—	43
Small pieces of stone	—	8	28	10	33	34	54	17	7	6	197
Cores	—	—	9	10	10	13	7	—	—	—	49
Edge ground axes	1	—	—	—	—	—	—	—	—	—	1
Sumatraliths	—	1	1	1	—	—	—	—	—	—	3
Chipped-pebble axes	—	1	4	1	—	—	—	—	—	—	6
Hammer stones	—	—	2	—	—	—	—	—	—	—	2
Anvils	—	—	3	—	—	—	—	—	—	—	3
Hammer-anvil stone	—	—	1	—	—	—	—	—	—	—	1
Flakes	—	—	16	—	9	35	10	15	—	6	91
Concave scrapers	—	1	1	—	2	6	—	—	—	—	10
Discoidal scraper	—	—	—	—	1	—	—	—	—	—	1
Microlithic segments	—	—	4	—	2	—	—	—	1	—	7
Microlithic points	—	—	4	—	—	—	—	—	—	—	4
	1	11	80	32	70	88	84	32	8	12	418

Other material: Three very small fragments of red ochre, much too small to use. They could have been thrown out of a native's dilly bag. Three human "milk" teeth, two of which are pre-molars and one molar. The molar shows no sign of wear, and probably had not yet grown out of the gum. This would indicate that the child was from two to three years old.

The description of the larger implements includes those collected by Dr. Disher. To this should be added the six specimens sent to the University of Melbourne.

The anvils and hammer stones were used for re-sharpening the axes by trimming their edges, and in detaching flakes from the cores. One hammer stone has anvil pit-marks on its side, thus serving a dual purpose. The flakes were probably the most used tools in this camp, since they made good knives for gutting kangaroos and possums. Kangaroos were speared, and the points of the spears were kept sharp with the concave scrapers. The small number of these scrapers found testifies to the fact that the spears, and all other implements for that matter, were made elsewhere, and only re-sharpened or repaired at this camp.

The few microliths collected do not help to solve the problem of their use.

It will be noticed that there was not one single yam-knife, mortar, or pestle to indicate the presence of women in this camp. These implements are always in evidence at large camp sites. The yam-knives, which are often included by collectors amongst the "end scrapers", were used to peel yams and to clean certain edible roots. The mortars and pestles were used by the women for crushing grass and other seeds into flour with which to make damper.

Women, as is well known, never accompanied the men in hunting expeditions, but went off gathering vegetable food on the plains, and small aquatic animals and shell fish in the swamps nearer to the main camp. The plain below this camp did not remain flooded long enough to attract a population of eels, yabbies, and fresh-water mussels. In any case, it was too far from the riverside camps for the women, who were, no doubt, burdened with young children.

This leaves the problem of the infant's teeth. A child, of course, would not have accompanied the men in a hunting expedition.

However, it is not claimed that this locality was tabooed to women, and they would have walked through it at times, especially when following their menfolk when the main camp was being shifted from one locality to another. It was probably on one of these occasions that the mother, who had carried her dead infant for some months, finally deposited what was left of its little body in a hole she excavated with her yam-stick on the sandy ridge.

Teeth are the hardest and the most resilient part of the human frame, and they endure long after the rest of the bones have disintegrated. The finding of these teeth, therefore, does not invalidate my assertion that this was a hunter's camp.

Acknowledgements

It is my pleasant duty to thank Dr. H. C. Disher for putting the entire extent of Strathfieldsaye, and all his notes and knowledge, at my disposal for the purpose of investigating its aboriginal antiquities. Further, I wish to thank him for his old-world hospitality; it made my self-imposed task an enjoyable interlude.

Book Review

A Guide to Native Plants

by A. M. Blombery

Published by Angus and Robertson

$15

This is a book to stimulate interest in Australian native plants, giving suggestions of many species that may be grown and very valuable detailed instructions on how to grow them.

Hundreds of fine line drawings, often with enlarged insets, photographs and beautiful colour plates are an excellent feature of the book. An obvious small slip in labelling, Fig. 8 interchanges a *Leptospermum* and a *Banksia*, and in Plate 8 a *Diuris* is mislabelled *Eriochilus*.

Part I explains the divisions of the Plant Kingdom. Basic terms, general features of plants, and functions of parts are simply explained. Inevitably, oversimplification may cause confusion as is evident in "egg cell or ovule" and the "micropile of the female archegonium" and "spores are sexual means of reproduction in ferns and their allies".

Part II deals with Ferns and their Allies, Part III with seed-bearing and flowering plants excluding grasses and orchids, and Part IV with orchids.

Family descriptions and generic keys, generic descriptions and a large number of species are described. The genera are in alphabetical order and in each case the family is indicated and the figure or plate number given for reference.

One is struck by the need for an Australia wide agreement on simple names (as in the F.N.C.V. census) in a field in which the scientific name is so liable to revision. In this book two species are called prickly moses e.g. *Acacia ulicifolia* and *A. echinula* while the Victorian *A. verticillata* (prickly moses) isn't mentioned.

The State in which each species is found is recorded.

A nine page glossary is most helpful.

This is a useful book for the increasing number of people becoming interested in native plants and growing them. It is hoped that by it more people will be stirred to experiment and improve strains making them more amenable to garden conditions so that, instead of the dominance of exotic and often flowerless types in our parks and gardens, native plants will predominate, their flowers attracting honeyeaters and other birds.

L.M.W.

FIELD NATURALISTS' CLUB OF VICTORIA

BALANCE SHEET AT 31st DECEMBER, 1967

Year 1966	Liabilities		
$304	Subscriptions paid in advance ..		$451
515	Sundry Creditors		288
664	M. A. Ingram Trust grant in hand		343
	Special Funds and Accounts—		
3,244	Building Fund	$3,169	
3,946	Publications Fund	4,100	
100	Library Fund	100	
189	Club Improvement account ..	521	
200	Excursion account	200	
5,217	Estate Marion Wright legacy	5,217	
418	Estate Ruby A. Lewis legacy	418	
—	Estate Miss I. F. Knox legacy	200	
905	Microscope Project account ..	1,033	
922	Reserved Income account ..	—	
			14,958
4,618	Surplus of Assets over Liabilities		5,183
$21,242			$21,223

Year 1966	Assets		
$3,841	Cash at Bank and in hand	$3,388	
675	Sundry Debtors	346	
72	Badges and Carstickers on hand at cost	63	
89	Microscope Project Stock at Cost	42	
136	Books on hand for sale at Cost	557	
			$4,396
3,899	Library Furniture and Equipment at Cost		4,218
	Investment of Funds—		
	Publications Fund—		
1,200	Commonwealth Bonds at Cost	1,200	
	Stock valued at Cost—		
353	Victorian Ferns	272	
973	Victorian Toadstools ..	901	
785	Wyperfeld National Park	708	
63	Sundry Debtors	61	
572	Cash at Bank	958	
			4,100
	Building Fund—		
2,100	Commonwealth Bonds at Cost	2,100	
1,000	State Electricity Commission Stock at Par	1,000	
144	Cash at Bank	69	
			3,169
	Library Fund—		
100	Commonwealth Bonds at Cost		100
	Legacy Estate Marion Wright—		
5,200	Commonwealth Bonds at Cost		5,200
	Cosstick Reserve—Maryborough—		
40	At Cost		40
$21,242			$21,223

I report that in my opinion the accompanying Balance Sheet and Accounts are properly drawn up in accordance with the provisions of the Companies Act 1961 and so as to give a true and fair view of the state of the Club's affairs at 31st December 1967 and of its operations to that date, also that the accounting and other records examined by me are properly kept in accordance with the provisions of the Act.

Signed:

Danby Bland & Co.

GENERAL ACCOUNT

STATEMENT OF RECEIPTS AND PAYMENTS FOR THE YEAR ENDED 31st DECEMBER, 1967

Year 1966	Receipts		
	Subscriptions Received—		
$225	Arrears	$36	
4,449	Current	4,286	
109	Supporting	156	
			$4,478
212	Sales of Victorian Naturalists		288
245	Advertisements in Victorian Naturalist		194
	Interest Received—		
5	Library Fund	5	
144	Bank Account	126	
208	Investment of M. Wright legacy	221	
			352
210	Surplus from Excursions		12
13	Sundry Income		64
202	Amount transferred from Building Fund Account for payment of rent		239
$6,022			$5,627

Year 1966	Payments			
	Victorian Naturalist—			
$3,600	Printing		$4,275	
766	Illustrating		1,359	
399	Despatching		410	
14	Editorial Expenses		67	
			6,111	
	Less Ingram Trust Grants		1,514	
				$4,597
	Working Expenses—			
99	Postages and Telephone		34	
136	Printing and Stationery		40	
40	Rent of Room for Storage		40	
53	General Expenses		45	
36	Affiliation fees Subscriptions and Donations		54	
16	Preston Junior Naturalists' Club Rent		15	
30	Natural History Medallion Expenses		24	
121	Accountancy, typing and clerical assistance	$1,180		
	Less Transfer from Reserved Income	922		
			258	
15	Mammal Survey Group Expenses	152		
(15)	Less Ingram Trust Grant	152		
			—	
				510
202	Rent of Hall and Library			240
	Insurance Premiums			34
510	Surplus for the year			246
$6,022				$5,627

FIELD NATURALISTS CLUB OF VICTORIA

BUILDING FUND

Amount of Fund at 31st December, 1966	$3,244
Interest on Investments and from Bank Account	164
	3,408
Less amount transferred to General Account for payment of rent	239
Amount of Fund, 31st December, 1967	$3,169

PUBLICATIONS FUND

Amount of Fund at 31st December, 1966		$3,946
Surplus for the year from—		
Ferns of Victoria and Tasmania	$11	
Victorian Toadstools and Mushrooms	1	
Vegetation of Wyperfeld National Park	69	
		81
Interest on Special Bonds and Bank Account		73
Amount of Fund at 31st December, 1967		$4,100

CLUB IMPROVEMENT FUND

Amount of Account at 31st December, 1966	$189
Nature Show Profit	486
Profit on Books Sales	165
	840
Less Books purchased for Library and Cost of binding Library books	319
Amount of Account at 31st December, 1967	$521

Subscriptions Now Due

Membership fees and subscriptions to the *Naturalist* for the year 1968 were due for renewal on 1 January. If you will not be paying your fees at one of the forthcoming meetings, pleast remit them by post to the Subscription Secretary. Receipts will not be issued for payments by cheque unless requested.

Failure to renew subscriptions may result in members' names being taken off the mailing list after 3 months from due date of renewal.

Field Naturalists Club of Victoria

SECRETARY'S REPORT

The eighty-eighth Annual Report, 1967

The 1966 report started "Is this the calm before the storm".

Well, while 1967 hasn't been stormy, it certainly hasn't been quiet: it has seen changes of three presidents, two secretaries, three treasurers, two assistant editors, three assistant treasurers, and two Book Stall sales officers—and a change from accountant to book keeper and subscription secretary.

Membership

80 members who were unfinancial last year have been pruned off the mailing list. We now have 469 Ordinary members, 294 Country, 32 Juniors and 143 Subscribers compared with last year's figures of 576 Ordinary, 303 Country, 43 Juniors and 143 Subscribers. This decline in Ordinary Membership is partly accounted for by the pruning of unfinancial members.

The Affiliated Clubs have dropped from 25 to 23.

This year has also seen the passing of old friends including Eustace Coghill, my predecessor and Mr. White the Assistant Editor and old time member Dudley Dickison, well known for his work on birds.

Organization

We are still finding it difficult to find willing volunteers, but what is not often realized is the matter is complicated by the population sprawl as Melbourne spreads further in the suburbs, ideally, the Council Members should consult as often as possible, but in practice find themselves separated by distances of anything up to 30 miles. We badly need younger people to train for Council, an election is no longer the time to look for office-bearers, the club organization has grown too complicated to learn in five minutes and can have a very tiring effect on people forced to assume office for fear of letting the club down. I ask, if you have any consideration for the club's future and cannot volunteer services—at least be a talent scout and foster enthusiasm.

Nature Show

The S.G.A.P. and ourselves have once again demonstrated the popularity of this event, with an all time attendance record over the three days of 7,142 people. This success is only due to the hard work of our band of enthusiasts who start planning in earnest six months beforehand. It must be mentioned here that D. McInnes and the Hawthorn Juniors are the proprietors of Instant Caves Ltd.: the caves come in assorted sizes complete with stalactites and stalagmites. We understand that with modern methods the manufacturing time has been cut from several million years to 26 weeks.

Excursions

Last year saw us renewing old friendships and ties with sister clubs in Victoria and other states. Joint excursions were planned with Latrobe Valley F.N.C., Barrier F.N.C., Portland F.N.C., and were of benefit to everybody.

Wildlife Protection

Because of the internal changes in organization, the activity in this field

has not been as great as in previous years.

We have protested together with the N.P.A., at misuse of the Mt. Buffalo National Park by the Motel Lessee and at the proposed Lake that they were intending to build which we contended would be detrimental to the best interests of the Park. This resulted in a joint deputation to the Minister for Lands and met with some degree of success—but we are not counting any chickens yet.

We and other bodies have also been approached by Parliamentarians to give our policies on conservation. As to whether the politicians benefit—only time will tell.

To this date we have been working on a Public Appeal to overcome the effects of the drought on wildlife, but this may fizzle out if the present rain continues.

There is a renewed interest in a Park in the Brisbane Ranges, but this will still take some time.

The release of the Pesticide Report is one that should concern us particularly with the revelation that pesticide in drinking water near Mildura is suspected as the cause of waves of gastric complaints. ref. Melbourne *Herald*, March 21.

It was good to see that this year the Fisheries and Wildlife Department saw fit to declare 400 acres along the Woori Yallock Creek a reserve to preserve the habitat of the Helmeted Honey Eater which is found only in Victoria and nowhere else in Australia. It is disheartening to realize that 400 acres is still very much smaller than the average area of a grouse shoot in Scotland.

Medallion

The Natural History Medallion for 1966 was awarded to Mr. J. Ros Garnet, well known as secretary of the National Parks Association and a long time council member of the F.N.C.V.

The award was presented by Mr. R. T. M. Pescott at the July General Meeting. The award for 1967 has recently been announced and will be presented to Mr. Whitely at the General Meeting of May 13 next.

Excursion Secretary's Report

Excursions during the year continued to attract members, and many localities were visited including a weekend excursion with the Latrobe Valley F.N.C. to the South Cascade Creek area, and the new National Park in Foster's Gully, Yinnar. During the September school holidays there was a trip to Broken Hill, with day outings led by members of the Barrier F.N.C. to such places as Mootwingee, where one of the petroglyphs depicting a lizard provided the design for the Barrier F.N.C. badge. Silverton, Umberumberka Reservoir, Twin Lakes, Purnamoota Field, and the Natural Resources Nursery and Churchill Park, Bellarine Peninsula, various mines were visited. During an overnight stop at Mildura the excursionists had a meeting with the Sunraysia naturalists.

Portland was the venue for the excursion from Boxing Day to New Years' Day, and once again we benefited by the hospitality and leadership of the local F.N.C., who took us to Mount Gambier, Cape Nelson, Bridgewater Bay, Learmonth Creek, Glenelg River, and Tower Hill.

Day excursions included Batesford with the Geelong F.N.C., a visit to Serendip Wild Life Research Station, Phillip Island, Marysville, Yellingbo, Pearcedale, Coimadai, Anglesea, Macedon and Hanging Rock for the

President's picnic, Flinders and Labertouche. The excursion secretary wishes to thank the members of the above clubs and all those who have done so much to assist her with the excursions. MARIE ALLENDER

General Meeting, 13 March, 1968

The President, Mr. E. R. Allan presided at the meeting attended by about 100 members.

The Secretary read a letter from the Native Plants Preservation Society thanking the F.N.C.V. for the trophy presented for the "In the Bush with a Camera" section of the Photoflora competition, which was won by Miss E. Kenny, with a slide of the Imperial White Butterfly on tea tree.

A letter was received from Mr. R. E. Green of North Caulfield, pointing out the lack of water in Fawkner and North Caulfield parks, where exhausted and dying birds have been found. He asked the Club to bring pressure to bear in the Councils to provide water.

Dr. Marion Wanliss reported the drying up of ponds in the Fitzroy Gardens, which was badly affecting bird life.

The President reminded members of an instruction from the Herbarium, to close the outer door 20 minutes after the time of the beginning of a meeting to prevent the entry of possible intruders to the building.

The subject for the evening was "Broken Hill Excursion" by Mrs. King. The talk was illustrated by colour slides, including a map of the route travelled, and others showing the nature of the country and some of the vegetation seen on the F.N.C.V. September excursion 1967.

The first bus stop was at Bridgewater on the Loddon River for lunch, and the night was spent in Mildura. The next day lunch was taken in the Lake Popiltah region where many poached egg daisies (*Myriocephalus stuartii*) were in flower, and Noisy Minas were seen in a black-box tree. A second stop at Pine Creek showed salt bushes and river red gums.

Approaching Broken Hill, the fenced regeneration area surrounding the city, initiated by the late Albert Morris, and keeping out grazing animals, contrasted strikingly with the miles of dry country passed over. The regeneration belt keeps down the dust problem and prevents erosion.

Mrs. King emphasized the kindness and help given by the Barrier Club Field Naturalists each day of our visit to the many points of interest; including old mine sites, the fire place of the first B.H.P. office, and a view of the heap of "Mt. Hibbard" from early mining operations, now in turn being treated for further ore, with the refuse being deposited in old excavations. Acacias, cassias and bellfruit trees (*Codonocarpus cotinifolius*) were seen.

In many places around the city, magnificent displays of the famous Sturt's Desert Pea in bloom were admired.

A visit was made to the Zinc Corporation mine at South Broken Hill, where officers conducted the party around the surface workings and to the fine museum of minerals and model of the lode, and to the beautiful lake with many water birds and lush vegetatoin.

The Wildlife refuge at the empty Stephens Creek reservoir showed kangaroos and emus feeding on the green grass at the bottom.

Silverton, the ghost town, still has some old buildings including churches, municipal buildings, gaol, school and hotel. The Barrier Club is concerned with the restoration and preservation of some of these.

After seeing Silverton, the party had lunch at Penrose Park, where lawns, trees and shrubs, with plenty of water laid on, made a splendid recreation area for Broken Hill residents of the future. Some birds and kangaroos were kept here, and historical objects included a 2 wheeled primitive ambulance of the area.

Other sites visited included the Umberumberka reservoir—a beautiful sheet of water with water birds which contrasted with the extensive view of the Mundi Mundi plain where willy willies of dust sprang up.

The old Purnamoota field area, site of the old Maybell homestead with the surviving quandong tree in fruit; and the Lubra mine area with the remains of a dry rock-constructed house; salt bushes such as *Kochia pyramidata* and *Atriplex inflata*, were all seen; and huge horse dropping fungi discharged clouds of spores when trodden on.

On the road to Mootwingee, where many of the Barrier Club members ac-

companied the bus in their cars, spotted bark leopard trees (*Flindersia maculata*), surrounded by their initial juvenile bramble growth, were seen as well as cassias, eremophilas, acacias, everlastings and salt bushes including *Atriplex spongiosa*.

The introduced Mexican poppy (*Argemone mexicana*) flourished in a spot where even mulga was dying.

At Mootwingee which is now fenced and looked after by a ranger, river red gums, callitris, solanums, acacias, cassias, eremophilas and *Isotoma petraea* in bloom were seen. Stencils and drawings by aborigines in the Snake Cave and petroglyphs near rock water holes were pelntiful. This had been a camping area for Burke and Wills and Sturt.

Another day was spent first at the Triple Chance open cut mine, producing feldspar, beryl and gem stones, the beryl being sent to Cape Kennedy.

On the way back, Thackaringa mine was seen and members of the party looked for minerals—siderite being plentiful.

Cockburn on the S.A. border, the end of the Silverton tramway, was also visited.

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On leaving Broken Hill the next stop was the Menindee Lake system on the Darling, where something of the complex water scheme was viewed including the Lake Pamamaroo Inlet regulator and Lake Weatherall. Sturt's tree where Burke and Wills camped was seen. After lunch, the kind friends of the Barrier Club, Mr. J. Baker, Miss M. Harding, Mrs. Baker and Mrs. Stewart, were thanked, and with goodbyes said, the party returned to Mildura Motel. In the evening, the Sunraysia Club entertained the F.N.C.V. at the beautiful old Chaffey home.

Next day, a stop for lunch was made at Hattah Lakes which, although showing signs of drying on the edges, had a great collection of bird life. The following day Swan Hill was reached and a visit made to the Folk Museum and old Paddle Steamer "Gem". After spending the night at Swan Hill, the road through Bendigo was taken and a lunch stop made in the Sedgewick area.

The president thanked Mrs. King for her talk, and the illustrations projected by Mr. Ian Morrison.

The president announced that the Annual Meeting was deferred until April. He brought to notice leaflets prepared by the Bird Observers' Club which painted a grim picture of what is happening to bird life. It publishes letters from all over Australia of the effects of pesticides, and urged country members to report changes in bird populations which may be due to pesticides, either to the B.O.C. or Fisheries and Wildlife Department for investigation.

Mr. R. Taylor emphasized the menace of broken glass in the bush and on beaches, and he said that the *Herald* reported that Mr. Hamer was attending a conference considering the possibility of restoring the bounty on unused bottles so they could be returned.

Mr. Taylor moved that the secretary write to the Minister for Local Government urging action to restrain the distribution of commodities in breakable glass containers. Mr. North seconded the motion but it was not carried.

Mr. J. Baines said that butchers were selling kangaroo meat not only for pets, but for human consumption, and it was a real threat to the existence of the kangaroo. He suggested that members should not buy from such shops. Mounted kangaroo heads are being sold for decoration.

Mr. Fairhall said that on the Broken

Hill trip, very few kangaroos had been seen except when approaching the Murray river on watered areas.

One member said that in a 5,000 mile camping trip only one kangaroo was seen, and that was tied up by the neck.

Dr. Wanliss advised that any shooting of kangaroos in Victoria should be reported to the Fisheries and Wildlife Department at once. Some shooters protest, they do not know kangaroos are protected in Victoria.

Exhibits and Nature Notes

Mrs. Matches and Mrs. Zorkler. Cones of Bunya Bunya Pine (*Araucaria bidwillii*).

Mrs. North. Flinders heavy whelk (*Altivasum flindersi*), a rare deep water salmon whelk, obtained from a lobster pot at Kangaroo Island, S.A.

Mr. E. Allan. Museum specimens of the Noisy Minar and Bell minar. He demonstrated their differences.

Mr. A. J. Swaby. *Crinum pedunculatum* from coast swamps of N.E. of N.S.W. and S.E. Queensland. He explained that the flower shows hook tips on the sepals which hold together, preventing the opening of the flower in wet weather, and so protect the pollen. In dry weather these tops shrivel and the flower opens. It was found that lilies failed to open in a damp glass house. Mr. Swaby has noticed on the chocolate lily a locking arrangement like this keeping the flower shut in damp weather. He exhibited 3 species of Hydrocotyle plants showing their simple beauty.

1. *Hydrocotyle muscosa*, S.E. or S.A. and W. Victoria.
2. *H. tripartita* (Slender pennywort).
3. *H. geranifolia* (Forest pennywort) E. and S. Victoria and N.S.W.

Mrs. Salau. Broken Hill minerals, mica, galena, kyanite, sphalerite, smithsonite, loellingite, garnite, inesite, coronadite, galena with rhodonite.

Miss J. Forse. Larva and mud burrow of a Swift Moth. This species was eaten by aborigines.

Mr. R. Condron. A large basalt column from Rocky Valley Dam.

Ten new members whose names appear in the March *Naturalist* were elected.

AT LAST !

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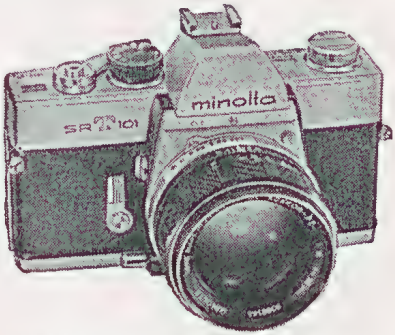

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KOALA SURVEY

The Native Fauna Conservation Society, in conjunction with the Education Dept. and Fisheries and Wildlife Dept., is undertaking a Koala Survey of Victoria.

Children of grades 4, 5, and 6, in State Primary Schools are being asked to help with this by filling in questionnaires, provided at their schools, during the week beginning 22 April.

It is to be hoped that adults too will co-operate and send any information to the nearest State School.

"KOALA"—Film Premiere

This film by Harold Pollock, showing the life history of the koala, together with other films, will be screened at Wilson Hall on Friday, 31 May.

Reserved seats obtainable at Allan's— Adults $1.00
Children under 14, 40c

Unreserved seats from door of Hall— Adults 70c
Children 20c

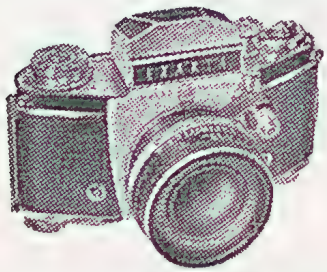
Wanted

One of our junior members, who has shown a keen interest in Mt. Napier in the Western district, asks for help in obtaining copies of the following *Vict. Nat.*, **73**, 60. He also seeks a list of any flora and fauna of Mt. Napier and the surrounding area.

Any information should be sent to G. Temby, Box 327, Hamilton, Vic. 3300.

Herbarium Doors to be Closed

It is brought to the notice of all persons using the Herbarium for nightly meetings, that the main doors should be shut twenty minutes after the commencement of meetings.



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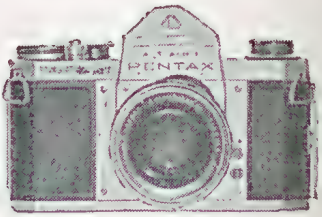

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F.N.C.V. DIARY OF COMING EVENTS
GENERAL MEETINGS

Monday, 8 April—Annual Meeting at National Herbarium, The Domain, South Yarra, commencing 8 p.m.

1. Minutes of Annual Meeting, held 13 March, 1967.
2. Annual Report.
3. Financial Report.
4. Incoming Officers and Council.

   The following have been nominated:

   President: Mr. E. R. Allan
   Vice-Presidents: Mr. F. Jeffs, Mr. T. Sault
   Secretary: Mr. D. Lee
   Assistant Secretary: Mr. R. Condron
   Treasurer: Mr. D. E. McInnes
   Assistant Treasurer: Mrs. King
   Subscription Secretary: Mrs. N. E. Lewis
   Editor: Mr. G. M. Ward
   Assistant Editor: Mr. P. Gahan
   Librarian: Mr. P. Kelly
   Assistant Librarian: Miss M. J. Lester
   Excursion Secretary: Miss M. Allender
   Council: Mr. B. Fuhrer, Mr. J. R. Garnet, Mr. A. Lewis, Miss Butchart, Mr. A. J. H. Fairhall
5. Appointment of Auditors.
6. Announcements.
7. Subject for the evening: "The Realm of Nature" by Mr. Marc Gottsch.
8. Election of Members.

   (a) *Ordinary:* Mr. Gary L. Wallis, 513 Elgar Road, Box Hill 3129 (Geology)
   Joint: Mrs. D. H. Behrend and Miss Monica Behrend, 9, Cremorne Street, Balwyn 3103. (Geology and Mammal Survey)
   (b) *Junior:* Mr. J. D. Milojkovic, 329 Punt Road, Richmond 3121. (Microscopy and Science)
9. Nature Notes and Exhibits.
10. General Business.

Monday, 13 May—Medallion Lecture and Presentation.

GROUP MEETINGS

(8 p.m. at National Herbarium, unless otherwise stated)

Thursday 11 April—There will be no Botany Group meeting this month.
Wednesday 17 April—Microscopical Group Meeting.
Friday 26 April—Hawthorn Junior F.N.C. meets in Hawthorn Town Hall at 8 p.m.
Thursday 2 May—Mammal Survey Group meets in Fisheries and Wildlife Dept. rooms, Flinders Street Extension, at 7.45 p.m.
Friday 3 May—Preston Junior F.N.C. meets in Rechabite Hall, 251 High Street, Preston (North from Bell Street) at 8 p.m.
Monday 6 May—Entomology and Marine Biology Group meets in the rooms of Mr. Strong at Parliament House, at 8 p.m. Enter through private gate at South end of building.
Wednesday 8 May—Geology Group meeting.

F.N.C.V. EXCURSIONS

Sunday 21 April—Afternoon and evening excursion to Sherbrooke Forest to study flora and nocturnal animals. Six leaders shall be in attendance from the Mammal Survey Group. Bring two meals, hot water requirements, and torches if required. Bus leaves Batman Avenue at 1.30 p.m.; fare $1.50. Private cars should meet at picnic area near pine plantation in Sherbrooke.

Note: This excursion is dependent on fire risk being sufficiently low. Any alteration to proposal will be announced at General Meeting.

12-15 April (Easter Excursion)—See details in the Victorian Naturalist for March 1968.

Field Naturalists Club of Victoria

Established 1880

OBJECTS: To stimulate interest in natural history and to preserve and protect Australian fauna and flora.

Patron: His Excellency Major-General Sir Rohan Delacombe, K.B.E., C.B., D.S.O.

Key Office-Bearers, 1968/69

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Vice-Presidents: Mr. Jeffs, Mr. T. Sault

Immediate Past President: Mr. W. L. Williams

Hon. Secretary: Mr. D. Lee, 15 Springvale Road, Springvale (546 7724).

Hon. Treasurer: Mr. D. E. McInnes, 129 Waverley Road, East Malvern, 3145 (211 2427)

Hon. Editor: Mr. G. M. Ward, 54 St. James Road, Heidelberg, 3084.

Hon. Librarian: Mr. P. Kelly, c/o National Herbarium, The Domain, South Yarra, 3141.

Hon. Excursion Secretary: Miss M. Allender, 19 Hawthorn Avenue, Caulfield 3161.

Hon. Sales Officer: Mr. E. R. Allan, c/o National Herbarium, The Domain, South Yarra, 3141.

Subscription Secretary: Mrs. N. E. Lewis, 1 Billing Street, Springvale 3171. (546 4649).)

Group Secretaries:

Botany: Mr. K. Kleinecke, 8 Oliver Street, Ashburton 3147 (25 2415).

Geology: Mr. T. Sault, 9 The Avenue, West Rosebud.

Microscopical: Mr. M. H. Meyer, 36 Milroy Street, East Brighton (96 3268).

Mammal Survey: Mrs. R. Frankenberg, 39 Huntingtower Road, Armadale 3143.

Entomology and Marine Biology: Mr. J. W. H. Strong, Legislative Council, Parliament House. Melbourne, 3002.

MEMBERSHIP

Membership of the F.N.C.V. is open to any person interested in natural history. The *Victorian Naturalist* is distributed free to all members, the club's reference and lending library is available, and other activities are indicated in reports set out in the several preceding pages of this magazine.

New Rates of Subscriptions for 1968

Ordinary Members	$7.00
Country Members	$5.00
Joint Members	$2.00
Junior Members	$2.00
Junior Members receiving **Vict. Nat.**	$4.00
Subscribers to **Vict. Nat.**	$5.00
Affiliated Societies	$7.00
Life Membership (reducing after 20 years)	$140.00

The cost of individual copies of the **Vict. Nat.** will be 45 cents.

All subscriptions should be made payable to the Field Naturalists Club of Victoria, and posted to Mr. D. McInnes, 129 Waverly Road, East Malvern 3145.

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F.N.C.V.

the VICTORIAN NATURALIST

Vol. 85, No. 5 MAY, 1968

Published by the

FIELD NATURALISTS CLUB OF VICTORIA

In which is incorporated the Microscopical Society of Victoria

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45 cents

NOTICES

In order that the work involved in sending out reminder notices be kept to a minimum, would members please renew their subscriptions as soon as possible.

Mr. A. Dunbavin Butcher will present the Natural History Medallion for 1967 to Mr. Gilbert P. Whitley, at the May General Meeting.

The date of the June General Meeting has been changed to **Wednesday 12th**, because of Monday 10th being a public holiday.

The subject of the evening for this meeting will be—"Flowers and Plants of Victoria in Colour" by Messrs. Willis, Fuhrer and Rotherham. All have worked on the preparation and production of the book of that title, which is expected to be available in July.

A volunteer is urgently required to fill the vacancy of Sales Officer, recently created by the resignation of Mr. E. R. Allan from that position. Apply to the Secretary or Mr. Allan for details.

Assistance will also be needed for Mrs. J. Strong, the Club's Bookstall Sales Officer, at this year's Nature Show. Enquiries from Mrs. Strong.

Copies of the *Naturalist* which are now unavailable are: **69**; No. 4, 10, 12. **70**; No. 3, 4. **73**; No. 8, 9. **76**; No. 2. **77**; No. 1. Any members who have these issues, and no longer require them, please contact Mr. D. McInnes.

The Victorian Naturalist

Editor: G. M. Ward
Assistant Editor: P. Gahan

Vol. 85, No. 5 9 May, 1968

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Front Cover:

An adult Wedgetailed Eagle arrives at the nest while two eaglets perch nearby. Note the discarded rabbit carcases in nest. Photo by Graham Pizzey.

Cypridid Ostracoda from Big Green Island, Furneaux Group, Tasmania

by K. G. McKenzie
and F. I. Norman*

Introduction

Recently, lists have begun to appear detailing the fauna and flora of some of the Bass Strait islands, e.g. Littlejohn and Martin, 1965; Mullett and Murray-Smith, 1967, but as yet these have neglected freshwater crustaceans. The present note remedies this defect somewhat with regard to the cypridid Ostracoda of Big Green Island in the Furneaux Group, Tasmania. Apart from the mere records, its purpose is to indicate that interesting results may emerge from sampling of a poorly known environment in the hope that this will stimulate further collecting, particularly in the Bass Strait area.

The basement of Big Green Island is mostly a jointed Devonian granite (see Fig. 2) which is in places overlain by dune limestone. Its physiography has been briefly discussed, and the vegetation noted in detail, already by one of us (Norman, 1966). Big Green Island lies in the belt of prevailing westerlies and has a mean rainfall of 30·2 inches. Mean temperatures range from 48·5°F to 63·1°F. There is no permanent water but shallow transient pools can form in rockbound depressions. The fauna discussed here was collected from two such pools sited approximately at opposing ends of the roughly longitudinal axis of the island (Fig. 1). The salinity of these pools is likely to vary considerably since rains would freshen them while storm waves and sea spray would tend to make the water brackish.

* Department of Zoology and Comparative Physiology, Monash University, Clayton, Victoria 3168, Australia.

Collections were made by scooping a plastic tube into the top six inches of the pools. It would be preferable, for the future, to take the zooplankton with a fine-meshed plankton net and to collect epibenthic and endobenthic animals by sampling the bottom sediments.

Fig. 1

Locality descriptions

The northern pool, pool A in Fig. 1, which was used as a well, has been closed for many years but was reopened in July 1967. Its depth was three feet when sampled (November

1967) but fluctuates according to the water table and has reached five feet (August 1967). The bottom is a muddy arkosic grit. No phytobenthos was observed at the time of collection. The pool is located in a slight depression surrounded by grass while the bush *Lycium ferocissimum* has colonized its seaward side providing some protection from sea spray. At the time of sampling, the T.D.S. (= total dissolved solids) of the pool water was about 9·2 ‰* (at 18°C). The fauna collected comprised the ostracodes *Bradycypris* sp. and *Cypridopsis* sp., cladocerans (including *Daphnia carinata* King) and a few mosquito larvae.

The second pool is at the south-western end of the island in a supralittoral rockbound depression (location B in Fig. 1, Fig. 2). The bottom is muddy, with cobbles and boulders, some of which are coated by a green algae, scattered throughout. It may dry out in summer with salt crystallizing at the surface but can attain a depth of three feet after rains or storms. Since it is only about 25 feet from H.W.M., westerly winds frequently drive in sea spray. T.D.S. of the pool water varies from 10,400 μmhos (May 1966) to 46,600 μmhos (January 1966) measured at 24°C (W. D. Williams, personal communication). The fauna of this pool consisted of *Cypridopsis* sp., *Daphnia* sp., numerous mosquito larvae and a crab.

Ostracoda

There is little or no information in the Australian literature regarding the two genera which occur on Big Green Island. Both are known to occur, however, in the fauna of south-western Australia (McKenzie, unpublished data based on collections by D. H. D. Edward).

Cypridopsis is a cosmopolitan genus especially well represented in the fauna of the Ethiopian Province which includes about 40 species; but there is only one good described Australian species, viz. *Cypridopsis australis* (Henry 1923) and a second, doubtful species, *Cypridopsis funebris* (Brady 1886). Several undescribed species of *Cypridopsis* occur in the south-western Australian collections referred to above and at least one other undescribed species lives on some littorals of Victoria's western district lakes so that in sum over half a dozen Australian species are known. *Cypridopsis* species typically are small (about 0·5 mm long) and subtriangular in lateral view and all have the reduced, whip-like furca which is a tribal characteristic.

* The symbol ‰ means parts per 1000.

FIG. 2. Pool above high water mark at south-western tip of island.

Photo: Authors

The genus *Bradycypris* was established by the great Norwegian biologist, G. O. Sars, for a moderately large (about 1·5 mm long) African cypridid characterized by a slender furca, transversely striated inner list, numerous chitin rosettes on the Zenker's organ and an ovate shape in dorsal view (Sars, 1924). No described Australian species have yet been assigned to this genus but from the illustrations the species recently referred to *Cypris crinata* Henry may well belong here (Chapman, in Bayly, Bishop and Hiscock, 1967) and, as noted above, there is a S.W. Australian species. *Bradycypris* is restricted to the Ethiopian and Australian Provinces. The Big Green Island population includes males and females and closely resembles the African type species except for minor differences in such characters as the shell and penis.

Discussion

Since Ostracoda do not fly and the genera concerned could not survive sea transport, it may seem difficult to account for their presence on Big Green Island. Several reasonable explanations, however, may be tendered. Thus they could have reached the island when Tasmania and the mainland were connected as, for instance, during the late Pleistocene. Again, since cypridid ostracodes possess resistant eggs, such eggs may have been blown to the island by the prevailing westerlies. Thirdly, ovigerous females or females and males could have been transported passively and survived in wet mud adhering to the webbed feet and underside feathers of migratory birds; or else the resistant eggs in mud caked to such birds could have been ferried to the island to initiate new populations. Possibly, the Cape Barren Goose (*Cereopsis novaehollandiae* Latham), although its movements appear to be locally centred now, has acted as a transporting agency in the past since it occurs in south Western Australia and South Australia as well as in the Bass Strait area, breeding on islands in each case.

Considering the larger problem of the distribution to Australia of these genera, it is not difficult to account for that of *Cypridopsis* since the genus is cosmopolitan and may well have utilized the Indonesian islands to reach Australia from the north. The restricted austral distribution of *Bradycypris*, on the other hand, may be better explained by passive dispersal either by winds or birds along the sweepstakes route provided by the path of the southern westerlies.

References

Bayly, I. A. E., Bishop, J. A., and Hiscock, I. D. (Eds.) 1967. An illustrated key to the genera of the Crustacea of Australian inland waters. *Australian Society for Limnology*, Melbourne.

Brady, G. S. 1886. Notes on freshwater entomostraca from South Australia. *Proc. Zool. Soc.* Lond. 1886: 82-93.

Henry, M. 1923. A monograph of the freshwater entomostraca of New South Wales. Part III. Ostracoda. *Proc. Linn. Soc.*, N.S.W. **48**: 267-286.

Littlejohn, M. J., and Martin, A. A. 1965. The vertebrate fauna of the Bass Strait Islands: 1. The amphibia of Flinders and King Islands. *Proc. Roy. Soc.* Vic. **79**: 247-256.

Mullett, J. H., and Murray-Smith, S. 1967. First footing on a Bass Strait Island: an investigation of Dover Island in the Kent Group. *Vict. Nat.* **84**: 239-250.

Norman, F. I. 1966. A note on the vegetation of Big Green Island, Furneaux Group, Tasmania. *Vict. Nat.* **83**: 294-299.

Sars, G. O. 1924. The freshwater entomostraca of Cape Province (Union of South Africa). Part II. Ostracoda. *Ann. S. Afr. Mus.* vol. 20.

Rare Bog Community at Tawonga

by R. K. Rowe

Bog is the name applied to a form of vegetation described (e.g. Costin, 1954) as an hygophilous community dominated by hummock forming mosses and acidophilous shrubs or helophytes and hydrophytes.

Although bog vegetation is commonly found at high elevations in the alpine and sub-alpine country in Victoria, it is not confined to those areas. It is however unusual to find it at low elevations. It is therefore of interest to record the existence of a bog community at an altitude of about 1,000 ft. in the Kiewa Valley just north of Tawonga. It is beside the Kiewa Valley Highway and therefore readily accessible to the public.

The site is a depression which carries water throughout the year, even after a dry summer such as this (1967). The average annual rainfall at Tawonga is 46 in. and the estimated average annual temperature is 57°F. This bog consists of sphagnum moss (*Sphagnum cristatum*) up to 4 ft. thick, with shrubs of mountain heath-myrtle (*Baeckea utilis*, formerly included under *B. gunniana*), alpine bottle brush (*Callistemon sieberi*) and short-flowered heath (*Epacris breviflora*), all of which are characteristic of the raised bog communities of the high mountains.

A number of herbaceous species also occur in the bog or in the saturated margin of the bog. Amongst these are the swamp millet (*Isachne globosa*), fairy aprons (*Utricularia dichotoma*), monkey musk (*Mimulus moschatus*), trailing Pratia (*Pratia pedunculata*) and cut-leaf cranes bill (*Geranium solanderi*, formerly included under *G. pilosum*).

Swamp gum (*Eucalyptus camphora*) and black sallee (*E. stellulata*) occur in the swampy area to the north of the bog. To the south, on rising ground, candlebark gum (*E. rubida*) grows with scattered manuka (*Leptospermum scoparium*) and Ovens acacia (*Acacia pravissima*).

There are small patches of sphagnum moss on the higher ground adjacent to the bog but the lack of permanent water makes it unlikely that they will persist. The soils of this higher area are red podzolics which are the characteristic soils of well-drained situations. It therefore seems that the bog has not been able to colonize the higher ground and that the small patches of sphagnum moss may have become established as the result of a temporary increase in the availability of water, possibly as a result of road drainage. The existing bog was probably never any wider

Raised bog of Sphagnum moss and woody and herbaceous perennials at Tawonga. The light coloured mass is the moss. *Photo:* Author

than at present but it may have extended further along the depression before the roads were constructed.

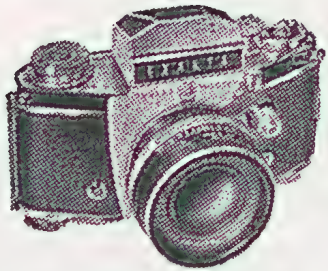
The existence at Tawonga of a bog, in which occurs a number of dominant species characteristic of the high mountain communities, raises the question of the status of the community. It seems that bogs were more common in this area prior to agricultural development in the valley. At least one quite large bog has been destroyed by fire in relatively recent years. (K. Mull private communication).

raised bog communities from the Monaro region of N.S.W. pointed out that they are a physiographic climax in that area and therefore likely to occur under varied climatic conditions. He suggested that in the Monaro region, bogs were probably more widespread in the Pleistocene glacial period and were probably reduced to the present range by increasing temperatures at the close of the late Pleistocene and Early Recent periods. He claims that "the alliance now barely persists under sub-optimum conditions, and in the event of climatic changes involving increased temperatures or reduced precipitations would probably disappear from the Monaro Region". To these possible destructive agencies may be added changes brought about by land development, such as in the availability of water or in fire.

Because it is readily accessible to the public and is possibly now one of a few, if not the only, bog left in the valley, it is worthy of preservation.

Reference

Costin, A. B. (1954). "A Study of the Ecosystems of the Monaro Region of New South Wales". Govt. Printer, Sydney.



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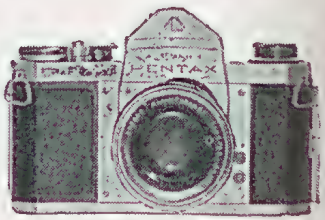

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Lady Julia Percy Island Revisited

by Trevor Pescott

Introduction

In December 1967, a group of seven naturalists from Victoria and New South Wales spent three days camped on Lady Julia Percy Island in Western Victoria; five of the group had visited the island on at least one other occasion, so it was possible to compare existing conditions with previous years.

Victoria had been under drought conditions through 1967, and the effect of this was very obvious at the island.

A description of the island, its formation, history, and wildlife appeared in *Victorian Naturalist* Vol. 81, No. 11, March 1965.

The following are observations made in December 1967.

Vegetation

The vegetation of Lady Julia Percy Island can be classified under four headings—bracken, grass, pigface and senecio—and the approximate extent of these is shown on the accompanying map.

The bracken and the pigface had not suffered greatly due to the dry conditions, and had not previously received a great deal of attention from the rabbits. The pigface however, was now being disturbed by the rabbits which seemed to be eating the roots rather than the fleshy leaves—presumably the latter have no nutritive value to them.

The bracken was dying off to a minor degree, but was not being attacked by the rabbits and appeared to be in no danger from them.

All the grass and thistles had died off, and were completely dried out; as was the senecio in all except the section near the "trig cairn" east of Seal Bay. Below this cairn is a good water drip which yields a continual flow of fresh water. Perhaps this provides sufficient surface moisture to keep the strip of senecio above it alive.

Elsewhere, all the senecio had dried out, and most had blown away, leaving the ground bare and very subject to erosion.

Rabbits

None of us had ever seen such enormous numbers of rabbits anywhere as were on Lady Julia Percy Island in December 1967; they were living amongst the rocks around the southern and western sides of the island, and amongst the bracken and pigface. There was an absolute swarming horde over the pigface in particular, for this was practically the only available food.

Many were using Muttonbird burrows as temporary retreats, and this in itself is creating a serious problem: for by enlarging burrow entrances, they are increasing the possibility of erosion, and already many acres of the island's surface have become "dust-bowls".

Perhaps the most amazing feature of our trip however, was to see so many half-grown rabbits dying of starvation. Despite the problem which the rabbits are creating, it was a tragic sight to see these animals too weak to run from beneath our feet. On one occasion, one moved slowly from under my feet into a shallow

LADY JULIA PERCY IS. 1967.

Drawn by Author.

burrow, and by the time I had removed the top of the burrow and extracted it (no more than a half minute later), it was dead. Others tried to run, but were unable to make their hind legs function properly.

Everywhere were dead rabbits—yet we estimated that there must have been scores of thousands on the island still alive.

There was no evidence of myxomatosis amongst these animals, as there had been in better years. Mosquito larvae were seen in rock pools below Thunder Point, but none were collected, as a rising south west wind made it impossible to climb down the cliff face which was drenched with spray.

Seals

The number of seals seemed to have increased slightly, with colonies along the east and west sides in particular developing as maternal sites instead of "bachelor" colonies as we noted three years ago.

The suckling of apparent "yearlings" as noted previously was again observed.

Fishermen told us that some of the seals remain at the Island throughout the year; this should be verified by naturalists.

Swamp Harriers

Swamp harriers were again the dominant predators of the rabbits, and at least six pairs were in residence, and two occupied nests with 3 well-feathered young in each were found.

One nest was extended as a feeding platform, and was 8 yards long and 2 yards wide. In this area were over 150 rabbit carcases. Another mound of rabbit carcases, probably a feeding platform, contained 50 carcases heaped up in the bracken.

Most of the carcases had not been eaten, the animals having been killed and left. These rabbits were invariably extremely thin.

There was at least one extremely pale harrier, a field description reading—"white on all undersurface except the throat, neck, wing tip and tail tip. The upper surface of the wing primaries and secondaries are also whitish."

It is interesting to note that a similarly coloured bird has been seen at Mud Island in Port Phillip Bay for several years.

Some of the rabbit carcases in the Swamp Harrier nest-feeding platform.

Photo: Author

Juvenile Swamp Harrier
Photo: Author

Diving Petrels and Fairy Prions.

On each evening we were at the Island, these birds arrived just as darkness fell after a short twilight; being unlike the muttonbirds which arrive after sunset during the twilight. The actual time of arrival however, varied by nearly half an hour, as a heavy cloud bank made the second evening far darker earlier. It seems the light intensity, rather than the time after actual sunset is significant.

Both were nesting, the localities of the nesting sites being shown on the accompanying map.

Tree planting

It is to be deplored that several trees, including pines and mirror-leafed coprosma, have been planted by local naturalists. This is a most unfortunate event, and any surviving plants should be removed at once, and further planting should be prohibited by the Fisheries and Wildlife Department who control the area as a Wildlife Reserve.

There have never been native trees there; the largest plants recorded by the early surveyors being "creepers and rushes". These Reserves should be restored or maintained in their natural condition, *not* altered simply to provide better camping cover as was done here.

Replanting and restoration of former vegetation is often necessary, but alien flora should not be planted unless it aids the creatures for which the area was reserved. In this case, seabirds and seals would not benefit from the species mentioned.

Rabbit destruction

Grazing, by stock formerly, now by rabbit hordes, has seriously damaged the native vegetation. The stock, now having gone, it is a most opportune time to remove the other scourge—the rabbits.

Unfortunately, the removal of the rabbits would inevitably mean that the Swamp harriers would also leave, but the future of the island with its shallow soil depth should be considered ahead of this one bird species.

Conclusion

The island is a wonderful area for fauna; and it is sufficiently inaccessible to minimize the problem of tourists. It is however most important to maintain the area as such, and to keep it free from any alienation which would detract from its value as a sanctuary for seabirds and seals.

Readers' Nature Notes and Queries

These columns are available for all members, young and old, to bring before others their own observations in nature. Correspondence may be sent to the Editor, 54 St. James Road, Heidelberg.

Flocking of Starlings.

This interesting account of the habits of one of our most, if not too successful, introduced birds, is given by J. Ros. Garnet.

Travelling northwards along Pascoe Vale Road, Moonee Ponds at about 6.45 p.m. on Saturday, 16th March 1968, we (and doubtless hundreds of others) observed an unusual spectacle. Thousands of Starlings perched closely, side by side, on telegraph wires for a distance of about half a mile in Pascoe Vale Road, and for lesser distances of a few hundred yards in side streets which debouched on that road. A few hundred birds were wheeling in the sky nearby, perhaps looking for a perching site.

It looked for the world like a gathering of the clan before migrating—as though, by some mysterious means, birds from near and far had been called together to take their final instructions and get a common bearing for a journey to a distant place.

We had no idea that so many Starlings existed in districts near enough for them to assemble in such number at a given moment, although we have vivid recollections of huge numbers wheeling in the sky in more rural localities in the autumn of years gone by.

There are still a few of the birds still about our own district of Pascoe Vale, so they cannot all have migrated.

[I remember from childhood, having watched similar wheeling flocks of starlings in the autumn; and on one particular evening, a member of the flock dropped suddenly to the roadway, quite dead. On inspection, its neck was found to be broken, and after a little thought, it appeared that the bird had collided with one of the overhead electric wires.—Ed.]

Colour Changes in Blue Wren

This note comes from Miss Jean Galbraith at Tyers in Gippsland.

Some years ago I recorded the growth of new feathers as, over three weeks in May, a cock Blue Wren changed from brown to blue and black. It was interesting to see this year in July (when one would hardly expect it), that several male Blue Wrens changed from their splendid blue and black to brown plumage again. I was away from July 31st, when the moult was well begun, until October 2nd. When I returned, the male was distinguishable from the female only by his dull brown (not chestnut) eye feathers and dark (hardly blue) tail.

One could not prove that they were the pair I had watched in July, but this seemed probable, for they came confidently to the window for cocoanut, as the July pair had done. In mid-October I noticed dark feathers (about ½ in. long) at the base of the cock bird's tail. I was away again from October 26th to November 8th and when I returned, two birds, presumably the same, still came to the window for food. The cock now had a typical blue head and back, and black breast and hind-neck, but a brown lower back, and the dark tailfeathers were now over an inch long. Only now (Nov. 28th) are black feathers visible down the centre of the lower back, and the dark blue tailfeathers as long as the brown ones, which look as if they may fall out at any time. I presume that it is usual for this colour change to occur during nesting (the birds have a nest in the garden), but it surprised me, and I wondered whether it might happen only with relatively young birds. (Nov. 29th one brown tailfeather shed.)

18 February 1968

After an active spring and early summer when, after the loss of the first nest and eggs (apparently found by a cat), the pair successfully hatched two broods

(3 and 2) all so far safe, and all regular visitors to the window for cheese and coconut, the cock showed the first sign of the autumn (really summer) moult on 6 February when the first brown feather showed on his blue crown. On 13 February I noticed the first brown in his mantle, and now most of the crown and the upper edge of the mantle are brown.

The second brood was fed by both parents and the three members of the first brood. Now all five young birds are independent and the hen is apparently sitting again, for the cock is usually accompanied only by the five young birds; but now and then the hen bird is with her family at the window.

All the wrens have found a new food supply in ants which come to the honeyeater's nectar bottle, and every now and then they leave the cheese and coconut for which they fearlessly enter the room if the window is open, to remove the latest trail of ants on the bottle.

[Young male wrens do not develop their brilliant plumage until they are about one year old; and up to about four years of age, they continue to suffer the winter in drab brown colour. However, after this period they appear to retain their brilliant colours the year round.—Ed.]

Wattle-bird's Feeding Time

David Jones of Balwyn, one of the eastern suburbs of Melbourne, sends this report on the feeding activities of both the Red Wattle-bird and the Little Wattle-bird.

On a recent warm night during January, I watched the absorbing antics of a group of Wattle Birds feeding upon dusk-flying insects. The birds, numbering between thirty and forty, had based themselves in a nearby Mahogany Gum which was heavy with blossom—no doubt an attraction also to the insects. With short laboured flights the birds foraged from the tree, and plucked the insects from the air with a sharp "clack" of their beaks. Several birds were in the air at once, and at no time was the air completely clear of them.

As I watched this scene of busy activity, two things suddenly came to mind which seemed unusual. The first was the silence—Wattle Birds are normally very noisy (especially when feeding); but here, the only sounds were the flutttering of wings and the "clack" of beaks.

The second was the tolerance of the two species (Red Wattle-bird, Little Wattle-bird) towards each other. Usually when feeding on the native plants in the garden, both species are very pugnacious, chasing away other birds and fighting among themselves until one, generally a Red Wattle Bird, has complete monopoly of the food source. Here however, were the two species constantly intermingling and feeding without showing any animosity towards each other.

As Wattle Birds are the dominant species in the garden. we have learned to recognize their usual habits. The only conclusion which I can draw from the above that the birds were hungry, and making the most of an abundant supply of insects.

Birds of Moulamein

Robert Marston of East Reservoir in Victoria, provides these interesting observations on birds near Moulamein in the N.S.W. Riverina district.

"Bundarool", a property of 2,500 acres, is situated 4·5 miles from Moulamein, in the Riverina district of N.S.W. Owned by the Morton family, "Budarool" consists of open-plains country, interspersed with mallee scrub and belts of timber along the watercourses. Spending a week there, from 6th to 13th January, was an extremely rewarding and satisfying experience. Weather conditions were fine, with temperatures by day of 85° to 100°F, while the nights were a cool 60° to 70°F.

The bird-list for the week contained 111 species, which included the following: Southern Scrub Robin, Yellow Rosella, Painted Honeyeater, Rainbow Bird (breeding), Blue-faced Honeyeater (adults and immature), Brolga (2), Brown Quail (3), Red-backed Kingfisher, Southenr Stone-Curlew (heard at night only), Barking Owl, Black Falcon, Mulga Parrot, White-breasted Sea Eagle (2 and disused nest), Spotted Harrier, Little Eagle (nesting), Crested Bellbird, Gilbert Whistler, Grey Falcon (2), Nankeen Night Heron (30 and 1 immature), Black-winged Currawong, Striped Honeyeater, Black-faced Wood Swallow (attacking Whistling Eagle), Satin Flycatcher (female), White-breasted Wood Swallow, White-fronted Honeyeater, White-headed Stilt (2 adults and 3 immature), Ringneck Parrot, Peaceful Dove and Black-tailed Native Hen.

Mornington

Here are another two reports from places visited by Victor Jacobs.

From a cliff top, we watched an Australian Gannet wheel gracefully and plummet after fish. On the parapet a very tame magpie kept company with a line of Silver Gulls. One pair of Caspian Terns patrolled the shallows and at times dived, or, it would be better to say, fell into the water. Their awkward dives belied their efficiency; for each time they retrieved a fish. Pacific Gulls also winged along the shore. In the distance, large flocks of Little Grebes bobbed on the surface. On rocks not far off shore, sat Yellow-faced Cormorants; one hanging its wings to dry. Another of the species swam, its body low in the water. Then, with a jerk of its head, it submerged. A line of bubbles on the glassy water allowed its progress to be followed until it appeared again with its "dinner" in its beak.

Avonsleigh - Macclesfield
(Map Ref. Monbulk, Vic. 486257)

In this steep gully country, Grey Thrushes and Blue Wrens were common. Flame Robins, Yellow Robins, Brown Thornbills and White-eared Honeyeaters were also seen. *Hakea nodosa* had finished its flowering season, but *H. sericea* was in full flower, as was Narrow-leafed Acacia. The latter Hakea must have been growing in that area undisturbed for many years, because many of the plants were more than 20 ft. high. At the bottom of the gully the track was cut by a narrow lively stream which was masked in spots by Scrambling Coral-fern.

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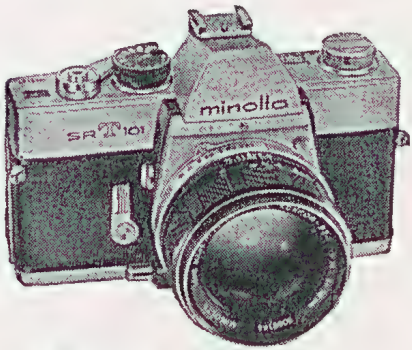

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The Spirit Cave at the Craigs, East of Lake Yambuk

by Aldo Massola*

One of the least understood facets of the social and spiritual life of the aborigines is the totem, most specialists having their own interpretation for the origins, reason and functions of that institution. Nearly all agree, however, that it is a belief in which the child is seen as a reincarnation of a supernatural ancestor who lived at the time "when men and animals were all one".

To the aborigines this ancestor was indistinguishable from the animal or object whose name it bore, except that he could reason like a man and act like a superman; and he was closely connected with a certain locality, which thus became a totem-centre. This locality could be a water hole, a cave, or a hill-top, a rock formation, a sea cove, or any other natural feature; and there the most important totemic rites had to be performed, since that was the place where they were first instituted by the ancestor.

Some of these totem centres were believed by the aborigines to be both the final resting-place of the totem-ancestors, and a kind of reservoir from where the totem spirit-children (both human and animal) originated. This was also the place to where the "ghosts" of totem members returned after death, to rejoin the Ancestral Spirit, only to await re-emergence and be reborn. This cycle of births and deaths thus guaranteed the continuity of both the totem and the totem-animal, and formed a link between the individual, the totem-animal, and the Ancestral Spirit.

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Although so important to the aborigines, with the one exception hereunder discussed, the locality of the several totem-centres in the Western District of Victoria was never recorded. This was most unfortunate, because it is now too late to follow this line of research. Few old aborigines remain, and, although quite a lot of information can be gathered from certain individuals, they *claim* to be ignorant of sacred matters, because they are brought up at Mission Stations and were never initiated.

However, in my book, *Bunjil's Cave*, I have recorded a legend which points to the Crow totem having had a "sacred water" in the Victoria Valley, in the Grampians; and I also believe that the rock shelters bearing aboriginal paintings, in the Victoria Range of the Western Grampians, were sacred to the Stump-tail Lizard; the home of this totem being probably what we now call Cultivation Creek Shelter No. 5. (See *Vict. Nat.* Vol. 81, October, 1964, for a description of this shelter.)

What may be still another totem centre is the unique and curious volcanic freak situated at the south-east base of Mt. Hamilton, a low mount south of Streatham. It consists of a square rock-hole, about 12 ft. across and 15 ft. deep, with absolutely unscalable walls, and with a natural rock-bridge spanning it from side to side. The hole is always half full of clear spring water, although at the time of my last visit (February, 1968) its surface was covered by a small floating waterplant (*Azolla* sp.). The aborigines called this hole *Purra Purra*, Red

Kangaroos, (after which the town of Pura Pura, about 5 miles distant, was named); and since no kangaroo, or no man for that matter, could possibly go down it to reach the water (or, rather, come out if he did), the name can only imply that it was the sacred place where the Kangaroo Ancestor, after his work of creation, finally retired, and from which, as a result of this action, red kangaroos (both human totem-members and animals) sprang.

I must emphasize that it is only my belief that the three above examples are totem centres, and that, as far as I know, there are no old records to uphold my claims.

The only recorded totem-centre in the Western District is Lady Julia Percy Island. This is an eye-arresting, singularly shaped, long, flat-topped island of volcanic origin, situated about 5 miles off the coast, approximately south of Lake Yambuk, which is 12 miles west of Port Fairy. Its coastline is extremely rugged, and consists of nearly vertical cliffs, the only access to it being an indifferent landing in a small bay on its northern side; and the heavy swell which generally comes from the south-west and rolls in upon the mainland coast makes a passage to it hazardous.

The island was often visited by sealers in the early days of the colony, and though it was never permanently settled by them, at least two are known to have been buried there, one in 1822, and the other in 1828. In 1876 a deposit of guano was found, but little of it was obtained, and work was soon abandoned. In 1886 an emergency station for castaways was established on the island, but it did not prove satisfactory. Since that time various applicants have been granted grazing licenses, but these ventures were all non-profitable. The island is now deserted.

Purra Purra Water-hole—Mt. Hamilton.
Photo: Author

Because of the heavy seas by which they are swept, conditions on the reefs fringing the island are unfavourable to molluscs, but muttonbirds, seals and penguins have always been there in great numbers. One would therefore expect to find signs of aboriginal occupation on the island, but, as far as I know, this is not the case. Perhaps the heavy swell was too much for their frail canoes.

From the Craig's shell midden, on top of the cliffs, Lady Julia Percy Island may be seen on the horizon.
Photo: Author

The Craigs

Photo: Author

The fact that Lady Julia Percy Island was a totem centre, was first brought to notice by James Dawson, in his book "The Australian Aborigines", published in 1881. However, Dawson appears to have been more concerned with a cave on the mainland opposite the island, for he wrote that:

> "On the sea coast, opposite Deen Maar—now, unfortunately, called Lady Julia Percy Island—there is a haunted cave called Tarn wirring, 'road of the spirits', which, the natives say, forms a passage between the mainland and the island. When anyone dies in the neighbourhood, the body is wrapped in grass and buried; and if, afterwards, grass is found at the mouth of the cave, it is proof that a good spirit, called *Puit puit chepetch,* has removed the body and everything belonging to it through the cave to the island, and has conveyed its spirit to the clouds; and if a meteor is seen about the same time, it is believed to be fire taken up with it. Should fresh grass be found near the cave, when no recent burial has taken place, it indicates that someone has been murdered, and no person will venture near it till the grass decays or is removed."

Before we proceed, it may be as well to discuss the native names used by Dawson. *Deen Maar,* the name of the island, should properly be written *Dhin mar. Dhin* is the pronoun "this", but it was often used by the aborigines instead of the article "the". *Mar* is Man, or, actually, an aboriginal. Dhin Mar thus means "The aboriginal", probably short for "the aborigines spirit-home".

Tarn wirring, the name of the cave, should probably be *Tarn wirrink, Tarn* being "flowing", and *wirrink,* "the spirit in man". Or, if *wirring* is correct, then it would mean "the whistling of the wind", perhaps this implying that "the spirit of the dead would flow like wind" to the island.

Lady Julia Percy Island was also recognized as a totem centre by R. H. Mathews, who, writing in the *Journ. and Proc. Roy. Soc. of N.S.W.,* in 1904, stated that: "The spirits of all the clans and phratries go to this island, which they occupy in common, the same as they did their native hunting grounds; there they remain until reincarnated."

Referring to the cave on the mainland, he stated that:

> "On the shore of the mainland facing the island there are some large rocks, into the base of one of which the ceaseless rolling of the billows has worn a cave-like recess, respecting which the natives have a superstitious belief that it is in some way connected with the island."

Mathews then goes on to explain that, according to his informant, the dead were laid in the grave with the head pointing to the island. The spirit issued from the body, and having provided himself with a firebrand of native cherrywood, proceeded to the shore where the cave is situated. The spirit chose cherrywood, incidentally,

because, when burning, it omits a peculiar odour, which was believed by the natives to have the power to ward off any danger from the bearer.

Upon reaching the cave the spirit divested itself of any clothes or ornaments it may be wearing, and disappeared over the intervening sea to the island.

Now it becomes obvious that though agreeing in principle, the two writers disagree in details, especially with reference to the cave on the mainland. Dawson simply states it to be "on the sea coast" and refers to grass at the mouth of the cave. Mathews states that the cave-like recess was worn into the base of a large rock by the sea, thus implying that it was at sea level. If this were so, there could be no grass found at its mouth. It appeared to me that neither of these two writers had actually seen the cave, but that they were relying on informants. I therefore decided to do a little bit of exploring, naturally restricting my investigations to that part of the coast from which Lady Julia Percy Island can be seen easily. This proved to be from about south of Codrington in the west, to Cape Reaumur in the east, a distance of about 12 miles; Lake Yambuk being about the centre of the two extreme points.

Starting from the west, to reach Lake Yambuk there are 6 miles of sandy shore, skirted by a long line of consolidated sand hummocks alternating with recent sand dunes; and no rocks are visible, except an occasional limestone mass outcropping through the sand. Clearly, no cave can exist there.

Lake Yambuk forms a welcome change from the monotonous dunes. It is actually the combined mouths of the Shaw and the Eumeralla Rivers, and the extent of the lake is governed by the flow of these two streams. When they are low, and the current is weak, the ocean deposits sand across the mouth of the lake. The sand forms a bar and holds back the waters of the rivers, which then flood the low ground in the valley and the lake thus covers a larger area. When enough water has accumulated, or the volume and weight of the water has increased through rain, the sand bar is washed away and the lake decreases in extent.

Lake Yambuk, with its permanent supply of freshwater, and with its teeming fish and bird population, must have been much frequented by the aborigines, and, in fact, there is a very large midden on top of the consolidated sand dune immediately to the west side of the mouth. Another attraction for the aborigines must have been the reef a little to the east of the mouth of the lake (Mills Reef), from which they no doubt obtained the large quantity of molluscs, the fire-scorched shells of which make up the bulk of the camp debris on the midden. However, there is no cave there.

The line of sandy hummocks continues east of Lake Yambuk for about 3 miles, and then gives place to striated and jagged rocky cliffs, while great boulders are strewn about for some distance out to sea, and these and the sandy shore are pounded by a long succession of foaming breakers. It is a weird and desolate place, wild after the smooth and peaceful sand dunes; and the wind blowing through the crags adds to it the voice of the uncanny. These are "The Craigs".

After breathing-in the stark beauty of the place I set about exploring it. The rocky cliffs continue for about one and a half miles, mostly fairly steep, but here and there there is access to the beach, about 60 feet below. There is ample evidence of erosion: detached rocks are heaped at the base of the

cliffs, and on top of a cliff the end-posts of a dividing wire-fence dangles suspended in mid-air, held by the wires. Erosion is still going on.

At the western end of the cliff-top there is a midden, covering about 2 acres. It consists mostly of fire-scorched mariner, limpet, and ear-

Spirit Cave is just below cliff-top. (Note rocks at foot of cliff.)

Photo: Author

shells, but here and there there are fragmentary bird- and seal bones. A few flint flakes and basalt hammer-stones are the only tools in evidence.

Towards the eastern end of the rocky crags, about a mile from the midden, high up near the top of a fairly easily negotiable cliff, there is a cave, the entrance to which is somewhat screened by stalactitic-like rock formations. The cave is about 6 ft. high and about 18 ft. wide, but only about 8 ft. deep, when it contracts to two burrow-like tunnels, about 3 ft. in diameter, which appear to go a long way into the cliff. They are pitch-black, and would require a torch to explore. Foxtracks leading into them suggests that they are inhabited by those carnivores.

At the foot of the cliff, immediately below the cave, there is a heap of very large slab-like rocks, which, obviously were once part of it, but must have collapsed and fallen down through erosion. Judging by these, the cave must have been quite large a hundred years ago, and even in its present diminished size, its locality, the stalactitic-like formation, and the dark tunnels at the end of it, give it an eerie look which would suggest that this is indeed the spirit cave. Lady Julia Percy Island can be easily seen from its entrance.

Certainly, there is no evidence of aboriginal occupation in or near the cave, and there is nothing to show that this is the one referred to by the previous writers. On the other hand the locality, we have been told, was shunned by the natives, so no evidence of occupation can be expected. Its only inhabitants were spirits, and they leave no traces.

Dare I think that I have located Tarn Wirring? I would think so. At least, it is the only cave on the coast-line facing the island.

Book Reviews

Birds of Paradox

Edited by JACK POLLARD

Published by Lansdowne Press, Melbourne.

9½" x 7" approx., 246 pages, 36 half-tone illustrations, and dust jacket in full colour. Price $5.95.

Two hundred and forty six pages of delightful reading, and pleasant browsing about the birds of Australia and New Zealand—birds which have held the attention of some of the world's greatest naturalists.

This comment I think, sums up "Birds of Paradox". It is a book of reasonable price which contains works of both fictional and non-fictional writers of the two countries, who have been inspired by the birds of the area.

It begins with a commentary on the birds noted by William Dampier on his voyage along the west coast of Australia; moves on through the early pioneers of natural history in this country, among them being John Gould, Sir Joseph Banks, and John Gilbert; recaptures the spirit of the late 19th and early 20th century naturalists such as Dudley Le Souef, Donald MacDonald, and Charles Barrett; and brings us to the present via other famous names like Alec Chisholm and Crosbie Morrison.

The book comprises four general sections devoted to bird tales, notable birds and bird watchers, general bird-lore, and bird-verse. These are not grouped separately between the covers, but are set in a manner apparently aimed to best suit the interrupted type of use for which the book is intended.

At times, however, I feel that this arrangement is not entirely successful. This is particularly so where an inset historical or other feature appears within the body of the main text, and so had the effect, for this reviewer, of destroying the continuity of the reading.

This of course is minor criticism of a most valuable addition to any book collection. This is an excellent introduction for those who have read little of the early naturalists' records; the wonderful writings of Mary Gilmore, Xavier Herbert, and others; or the verse of early and contemporary poets.

The illustrations of birds include photographs taken by such experts as Norman Chaffer and John Brownlie, and the dust jacket design is by Robin Hill.

Indeed, to have this book is a very good reason for watching television less often. G.M.W.

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"Naturalist's Diary": Norman A. Wakefield

(Longmans, 1967, 214 pages, $4.50) Reviewed by EVAN ROWLANDS

When Norman Wakefield began to write his weekly nature column in the *Age*, several years ago, I realized that a unique opportunity was at hand to learn from the experience of a remarkably gifted scientist. I began to collect articles, and today they lie yellowing and dusty in my files.

Now Norman Wakefield has earned the gratitude of such as I by collecting an early series of his articles into book form. And a fine book it turns out to be!

Produced on excellent quality paper and bound in a way that gives the appearance of red leather, it feels good in the hand of the book lover. Inside are eighty-two articles, arranged in seven sections: Places, Mammals, Birds, Reptiles, Spiders, Insects, and Plant Life. These are illustrated by over eighty photographs, the great majority of which have been taken by the author. My own favourites among these pictures would be the Helmeted Honeyeater at the nest (page 121), the Sugar Gliders caught feeding at night on the trunk of a Long-leaf Box (page 38), the awesome chasm of the Reedy River gorge (page 2), and the coloured frontispiece of the Western Pigmy-possum.

Based as they are on a lifetime of field work combined with sound scholarship, the articles are authoritative. Norman Wakefield writes in a simple intimate style; his love of nature is infectious; there is an appealing humility in his writings.

There is something of the frustrated explorer in me, and I have gained much pleasure visiting, in imagination, the rugged parts of far-eastern Victoria which are brought to me by this book. Thus I have strolled into the Mount Drummer jungle, experienced a hazardous canoe ride along thirty miles of the Snowy River gorge, and climbed Mount Ellery, guided always by the author's expert

Reedy River Gorge

commentary on topography, fauna and flora.

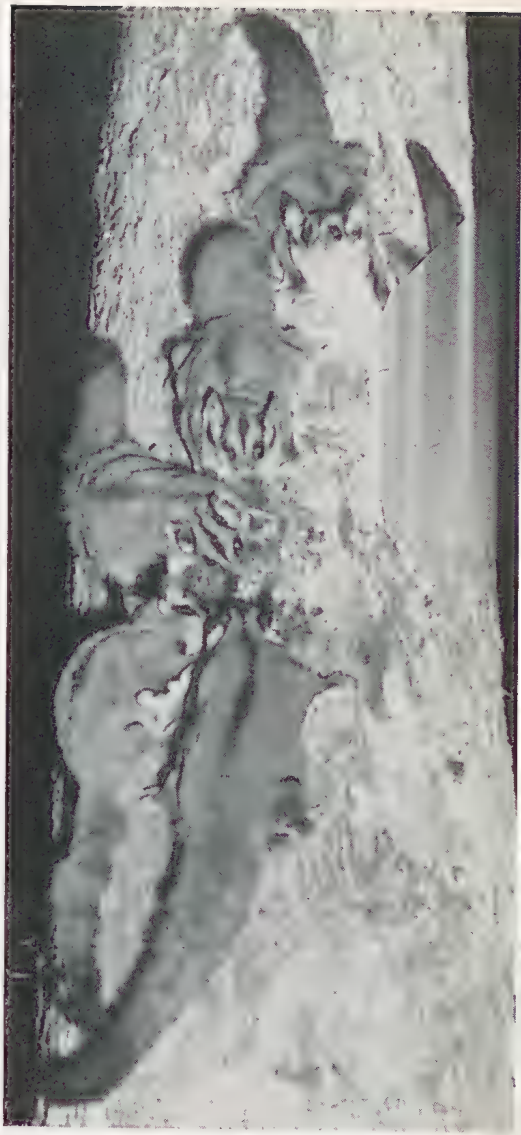
For the bird lover there are seventeen articles, and reference to more than fifty bird species. Discussion ranges from the appetite of ibis to the problem of speciation of the Helmeted Honeyeater.

Whatever your interest, you will be able to locate it quickly with the aid of the detailed index. Over two hundred species are listed there, and there is reference to about three hundred Victorian localities.

This is the book to relax with after a day's work. Soon you are revisiting the dark cavity of the Den of Nargun, or rediscovering the Brittle Bladderfern. When you yearn to be close to nature, but are prevented by the ties of daily life, pick up *Naturalist's Diary* and you may live it vicariously.

It is difficult to single out particular passages from a work such as this, but the following description of the Strathbogie Sugar Gliders is typical:

> They came from all directions, some gliding fifty yards or more across the gully. When in flight, the four limbs are spread wide, and there is a furry membrane on each side, stretching from hand to ankle. This makes a surface several inches square, allowing the little animals to volplane through the air.
>
> They preferred to feed in the head-down position, and a newcomer would usually squeeze in between the others or even push under them, rather than break this rule.
>
> Perhaps the outstanding attribute of the species is the ability to scamper about—downward, upwards or sideways—on the vertical trunks of trees. All claws are long and needle-sharp, and their grip is so sure that there is never the slightest uncertainty or hesitation. In particular, if one of the gliders is frightened when feeding, it will reverse its position in a single movement, disappear sideways behind the tree, and then be twenty or thirty feet up by the time one steps round to see where it has gone.



A limited stock of this book has been published and, rather than reprint when present supplies are exhausted, the author intends to produce further units. The final set will be little short of encyclopaedic. It promises to be a series of unique value to all who would know more about the Australian countryside and its wildlife.

Country Club News

In this issue, reports of the Western Victorian natural history groups appear. In the future it is to be hoped that sufficient news and comment from other *allied clubs, both Victorian and interstate, will be forthcoming in order that this particular page may continue in the future.*

News of conservation aims, nature shows, children's involvement in projects, and other relevant items should be sent to the editor.

REPORT OF ACTIVITIES OF INDIVIDUAL CLUBS FOR YEAR 1967

Ararat Field Naturalists Club

Membership 25 *Meets first Monday C of E Hall*

During the year the Club participated in the YMCA Hobbies and Pleasure Pursuits Exhibition; helped at the working bee at McDonald Park with the Rotary members; staged an exhibition with the Historical Society during the Ararat Festival, and gave three talks with slides to some of the men in the Ararat Warrak Road Prison.

Interesting observations included a new wader to the area—the long-toed stint (reported by Rev. Burtt); the Powerful owl; and a small flock of black-capped sitellas.

Secretary Miss Z. Banfield, 7 Ligar Street, Ararat.

Colac Field Naturalists Club

Membership 30 *Meets second Friday CWA rooms.*

Monthly excursions are conducted on the day following the meeting. Greater press publicity this year has kept the public aware of our existence which is most encouraging.

Meeting highlights from a varied program, were the lecture on "Spiders" by Mr. H. Swarbreck; and the address by the District Forestry Officer, Mr. D. Rolland, when he tried to explain to an unsympathetic audience why large tracts of natural bush in the Otway Ranges are being cleared to make way for pine plantations.

The Colac Club has been active in agitation to have several hundred acres at the mouth of Sherbrooke River added to the present Port Campbell National Park, and we are optimistic that something will be done. It is hoped, also, that in the forthcoming year steps can be taken to have some remnant of the Heytesbury Forest preserved. We are co-operating with the Heytesbury Shire engineer who is most concerned about the matter, and came along to a recent meeting especially to speak to us about it.

Secretary Mr. R. M. Missen, 'Flowerfield' Beeac.

Creswick Natural History Club

Membership 22 *Meets third Thursday, Wesley Hall.*

Throughout the year there were various local, and guest speakers. A very successful Nature Show covering five days, was held in April. A colouring competition for school children resulted in nearly 200 entries. Press, radio and television gave us good coverage, and the attendance was also very good. A wonderful Club spirit prevailed. We were hosts for the Spring Camp-out in September of the W.V.F.N.C.A. Excursions are held monthly.

Secretary H. L. Barclay, Raglan Street, Creswick.

DONALD HISTORY AND NATURAL HISTORY GROUP

Membership 25 *Meets first Friday, State School Centre.*

Guest speakers during 1967 were—Miss Ruth Marriott, geologist, "Rock formations"; Mr. R. P. Falla, "The Introduction and Improvement of Farm Machinery in the Wimmera"; Mr. John Landy, "Insect Protection Mechanisms"; Mr. Bill Middleton, "Changes in Wimmera Vegetation through the Centuries"; Mr. A. T. Craig, "The Work of the National Trust"; Mr. G. W. Letts, "Kalgoorlie Goldfields W.A."

During the year our Agricultural Machinery Museum was completed, and officially opened by the Minister for Agriculture, Mr. Chandler.

A catalogue for the Museum listing the exhibits and giving details of each, was written and compiled by Mr. R. P. Falla, our vice-president.

On several occasions one of the group's members, Mr. J. Barrance, has conducted groups of school children on natural history excursions.

Secretary Mr. J. Hollis, Corack East, 3477.

GEELONG FIELD NATURALISTS CLUB

Membership 371 *Meets first Tuesday.*

Guest speakers appeared throughout the year, while two evenings were devoted to Members' Nights. One excursion was held per month.

From 7-10 April, we had a stand at the local Scouts Hobbies Exhibition. On 6 and 7 October we combined with the Society for Growing Australian Plants to run a Nature Show, at which a total of 2656 persons attended.

We had an Annual Camp-out at Halls Gap on 28-29 October, with about 90 members attending.

Secretary G. McCarthy, 26 Fairbrae Avenue, Belmont.

HAMILTON FIELD NATURALISTS CLUB

Membership 30 adults, 10 juniors. *Meets third Thursday State School.*

Six special children's evenings were held during the year. These were free, and open to any child or adult. Nature films from the State Film Centre formed the major part of the programmes. Children were also encouraged to bring exhibits for discussion. Attendances varied between 70 and 200, with ages between 5 and 12 years; as well as a number of adults. Both age range and size of audience presented problems. We would be interested to hear what provision other clubs make for children. Excursions on last Saturday in month.

Secretary Mrs. M. Corrick, Box 53, Hamilton.

HORSHAM FIELD NATURALISTS CLUB

Membership 42 *Meets fourth Thursday.*

Official club outings were held at Hawker's Gully and Cuack (north of Mt. Arapiles). Some members assisted with the clearing of a track to an interesting isolated rock containing a hole, known as *Tilwindie,* aboriginal for "hole in a rock". This was later sign-posted by the Wimmera Shire Council.

Talks were given to the club by Mr. Malcolm Douglas on "The Dangers of Introduced Species"; Mrs. Jean Hill, "A Field Naturalist's Trip across Central Australia"; Mr. Milne, "Astronomy". Members took the opportunity of viewing the planets through the school telescope. Dr. George Ettashank, senior lecturer in Zoology at Monash University, gave us a fine lecture on "Communications", with special emphasis on his own research into ants' behaviour.

Question Night—Members brought and read their answers to questions distributed at a previous meeting.

Book review—Members read a natural history book announced at the previous meeting, and brought a review.

Representatives of this club attended a Departmental inquiry into the future of the Darlot Swamp. Five Departments were represented, as well as other local organizations and interested groups.

Sanctuary—After many years of negotiations, 30 acres of virgin mallee (a tongue intruding into the Wimmera and donated to Horsham F. N. Club) has been "cleared" by the Crown Lands Department to allow recognition of ownership. A committee of management, under the auspices of the Shire of Arapiles has been appointed.

Secretary Mrs. L. McKenzie, 11 Rose Street, Horsham.

MID-MURRAY FIELD NATURALISTS TRUST. Nyah West.
Membership 31 adults; 13 juniors. *Meets third Friday.*

1. Activities—Two or three films from State Film Centre were shown at beginning of each meeting.

2. Monthly excursions—This has been a year of discovery for most members, because only a few of us had any idea that so much interest and variety was to be found among native plants and bird life in the dry Mallee.

3. One highlight was a visit to the Ibis rookeries at Kerang.

4. An exhibit of about 80 native plant specimens of this area was shown at the Victorian Resources Convention held in Swan Hill last October. This number included most trees and shrubs, and only a few of the many small plants found locally.

Secretary Mrs. G. Willoughby, Nyah West.

MARYBOROUGH FIELD NATURALISTS CLUB
Membership 39

Efforts are being made to stimulate the interest of junior members. Club meetings and excursions have been held monthly, and the opportunity has been taken to join with convenient excursions organized by Ballarat and Bendigo Field Naturalists Clubs. Special activities—

1. The investigation of conditions governing mineral and mining leases held in this area by the Planet Mining Co.

2. Successful opposition to application for grazing leases in local forests.

3. A campaign against the indiscriminate use of toxic pesticides; addressed principally to over 200 district farmers.

4. A study of local forest areas worthy of preservation, as a prelude to action in presenting a case to the Land Utilization Advisory Council.

5. The gradual building up of the Club's Conservation Account, with the objective of fencing in the Alma Road Wildflower Sanctuary.

6. Maintenance of protective mesh fence around the Aboriginal Rock Water Wells and regular inspection and supervision of two wildflower reservations (about 90 acres).

Secretary Mrs. E. Courtney, Carrick Street, Maryborough 3465.

PORTLAND FIELD NATURALISTS CLUB
Membership 39 adults; 8 juniors *Meets second Friday at Town Hall.*

Meetings—Visiting and local speakers appeared. Each month a member speaks for a short period on one subject, such as how to identify some common local shells or eucalypts.

Co-operation with public—Exhibit with local Camera Club at Trade Fair. Guided nature tours conducted for members and visitors. Sign made and erected at Learmonth Creek (of special nature history interest).

Conservation—1. Fencing of Nine Mile Flora Reserve. 2. Conducted RACV members on tour of proposed Lower Glenelg National Park.

Publications—"Birds of Portland" by Noel Learmonth, published and on sale through the club.

General—1. Nomination of Cliff Beauglehole, and help in preparation of his dossier, for Natural History Medallion.

2. Investigation of report of "striped animal" at Kentbruck.

3. Planned tour and conducted members of Victorian Field Naturalists Club for their visit to Portland over Christmas and New Year period.

Secretary Miss J. Lineker, 40 Must Street, Portland.

STAWELL FIELD NATURALISTS CLUB
Membership 33 adults, 7 juniors. *Meets fourth Monday at Technical School.*

Outings—One full day (Saturday), and one half day (Sunday) per month.

At present we have three established native plant sanctuaries—C.R.B., approx. ¼ acre; Three Jacks, 18 acres (2½ acres fenced); and Lake Fyans, 3 acres. A series of slide nights were held at Halls Gap during the Christmas holiday period to finance the fencing of another sanctuary of 11 acres. We should have sufficient money to complete fencing this year.

Secretary Mr. C. Bennett, P.O. Box 10. Stawell.

WARRNAMBOOL FIELD NATURALISTS CLUB
Membership 43 seniors, 13 juniors. *Meets fourth Wednesday at CWA rooms.*

Activities—Guest and member talks; slides and films; specimen identification; bird, bat, and butterfly banding; field outings and promotion of flora and fauna protection wherever possible.

Guest speakers were—Mr. Graham Pizzey, Mr. Edmund D. Gill, Mr. Ros. Garnet and Mr. John Seebeck.

Success has been achieved in having the Framlingham Forest permanently reserved in its natural state.

Secretary Mrs. N. Alford, Grassmere.

SUNRAYSIA NATURALISTS RESEARCH TRUST, MILDURA
Membership

Monthly meetings, preceded by a short film of Natural History interest were held regularly during 1967. Every general meeting of the Trust was addressed by a guest speaker, and in 1967, the standard of these talks was particularly high. Field outings took place monthly. Some were of a more or less picnic nature; while others were under the guidance of one or another of our Study Group leaders, and were more seriously inclined. All were well attended, and at least two were overnight stops. These latter proved so popular, that similar excursions will be included in our programme for 1968.

Visitors—Visitors from other Naturalist organizations are always welcome at our General Meetings, and we extend a special invitation to members of the WVFNCA to attend whenever they are in our district.

Specialist Groups—Botany, Butterfly banding, Geology, Growing of Australian plants, Nature Photography, RAOU Nest Record Scheme, Reptiles, Spiders.

Secretary Mr. H. Thomas, Box 763, Mildura 3500.

Field Naturalists Club of Victoria

Annual Meeting—8 April 1968

Approximately 150 members heard the president, Mr. E. R. Allan, open the meeting and extend a welcome to any visitors. He suggested that more members should make a point of wearing their name tags at meetings, to aid in introductions during informal conversation.

The minutes of the previous Annual Meeting, which was held in March 1967, had been approved by Council; and on a motion from Mr. Woolard that they be taken as read, were confirmed.

The minutes of the General Meeting held in March of this year were also confirmed and taken as read.

At this point in the evening, the president introduced the guest speaker, Mr. Mark Gottsch, who was to speak on the "Realm of Nature".

With a grand selection of well chosen colour slides, projected by Mr. Colin Hancock, members were introduced into the lowly world of the diatom, amoeba, and sea-anemone; and travelled on through some of the moth and butterfly families; various beetles; grasshoppers of mountain and mallee; birds of the forest, field and desert; mammals, monotremes, and reptiles; fish—both living and fossil; spiders and their relatives; and fungi of various types—truly a large slice of Nature's realm.

Some important points to be drawn from the speaker's address were the effects of pesticides (used recklessly) on bees and birds which aid in pollination; the destruction of habitat as a major contributory fact in the decline of many species of fauna and flora; and our unquestioning readiness to kill that which we assume to be harmful. The latter statement was brought home to the speaker through a remark made to him by his 7 year old daughter. She told him that a particular species of ant she had read about, only "bit because it had been attacked". He then remarked how true it was that we do tend to bring our heel down on so many things, merely because of past associations or stories.

The second of the former two statements, regarding loss of habitat, is clearly emphasized by the plight of the Fairy

Tern in its search for appropriate nesting sites. It is well known that a quiet stretch of isolated foreshore is desirable; and it is even more well known that these days, such an area is extremely rare. Other birds and animals are no doubt in similar plight. The main conclusion therefore, to be drawn from the address, in the speaker's own words was to "protect the habitat".

The president thanked Mr. Gottsch and Mr. Hancock for their presentation of such an informative and interesting address. Those present endorsed this with applause.

The business of the meeting was then conducted, and the secretary read a letter from the Barrier F.N.C., thanking the F.N.C.V. touring party for their gift of books for their library.

Miss Young spoke of an article by the late Tarlton Rayment, on "Evolution of Hymenopterous Comb", and tabled some copies of this for members' perusal.

Mr. J. Ros. Garnet moved for the adoption of the secretary's report, and commented on Mr. Lee's excellent work in taking over such an onerous task, at such a critical time. Mr. McInnes supported these remarks.

Mr. D. McInnes moved that the financial statement be approved and adopted. This was seconded by Miss Butchart, and carried. Mr. McInnes also mentioned and thanked Mr. Hooke for enabling the balance sheet to be prepared for the April meeting. He also made reference to two amounts which helped the financial position considerably. These were a grant from the Ingram Trust towards printing costs, and $900 from the reserve fund to help defray the expense of the accountant.

The president then commended Mr. McInnes for his fine work as treasurer.

Office bearers of the club are as listed in the *Naturalist* for April; and the election for Council members resulted in the following people being elected: Miss M. Butchart; Messrs. Fairhall, Fuhrer, Garnet and I. Morrison.

It was moved and seconded that Danby Bland and Co. be retained as F.N.C.V. auditors for the ensuing year.

The secretary reported on the meeting with representatives of the proposed North-east F.N.C. during the 6-8 April. He also hinted at the lack of contact between the F.N.C.V. and country clubs and suggested that we should endeavour to help such clubs with any problems.

The members whose names appear in the *Naturalist* were elected.

Under General Business, Mr. Woolard commented upon the work done by Mr. McInnes for the Hawthorn Junior F.N.C., and suggested we should encourage the juniors.

Mr. Baines spoke about other magazines from kindred clubs, and suggested that more reports from country clubs should be published. [This is now being accomplished—Ed.]

Mr. Swaby moved that the Council be thanked for their work done throughout the past year.

Nature Notes and Exhibits:

Mr. A. J. Swaby exhibited well labelled specimens of *Pittosporum phyllyracoides* (Weeping pittosporum), showing the sticky red seeds which cling to the open "berries" in readiness for the bird which aids in distribution of the species.

He also had specimens of the germination of the Nardoo plant, shown under microscopes.

A specimen of Pineapple Opal from White Cliffs was exhibited by K. E. Hall.

Another exhibit showed examples of an Acacia species with the transition stages from pinnate leaves to phyllodes.

Fossil leaves from Oligocene age (app. 40,000,000 years), obtained at a quarry in Narre Warren, were shown by Mr. T. Sault.

Mrs. Taylor spoke about a specimen of Omeo Gum (*Euc. neglecta*), and Mr. Jeffs commented on the relatively quick opening of the seed capsule (4 hrs.).

Mr. Fairhall spoke of the desirability of planting *Correa* spp. in gardens, because of their long flowering period.

Botany Group Meeting

14 March

The meeting was attended by 23 members and visitors, and Mr. B. Fuhrer took the chair. One of our members, Mr. R. Filson, gave the second talk in his series on "Lichens". He stressed the importance of the chemical contents of lichens, which through an addition of chemicals such as potassium hydroxide, paraphenylene diamine and hydrochloride show a positive or negative reaction. This was clearly visible by some lichens changing colour. Some lichens were luminous when exposed to ultra-violet light. Both examples were shown by experiments. Various species of lichens were exhibited, and many questions were answered by Mr. Filson, who was thanked on behalf of all members by the chairman.

Geology Group

3 April

31 members and visitors attended with Mr. Davidson in the chair. The subject for the evening was an illustrated talk on the areas surrounding the large iron ore deposits in West Australia by Mr. Neilson. The speaker firstly explained the geological sequence. The oldest rocks exposed are of Archaean age and are part of the old Pre-Cambrian shield. They are of granite gneiss of which there are two phases—the greenstone phase and the whitestone phase. Overlying these and unconformable to them, are rocks of the Nullagine System, which are of Proterozoic age. The Greenstone Phase consist of ancient lavas and intrusive rocks related to basalt, very much altered, and are therefore metamorphic rocks. Rocks of the Whitestone Phase are predominantly light in colour which distinguishes them from the dark coloured greenstones. Where they meet, they appear conformable to the greenstones. The Nullagine System consists of a great succession of sandstones, quartzites, conglomerates and interbedded volcanic rocks. As a rule they are little altered but have been invaded by dykes and sills of basic rocks. The speaker explained how the topography in many places is formed by a rock called Quartz-Hematite, commonly known as Jasperlite. Bars of this rock are a prominent feature in the west and many can be followed for miles along exposure ridges which are up to 200 feet high. It is a dark red or nearly black fine grained rock and is more resistant to erosion than other rocks in the arid conditions which prevail. He said the Mt. Goldsworthy ore body is surrounded by Jasperlite which contains up to 33% iron. At present this is not worked owing to the higher iron content of the main ore, hematite which contains 50% to 60% iron. However, after the main ore is worked out it is possible the jasperlite will be mined. He spoke at length on the 3 main deposits—Mts. Tom Price, Newman, and Goldsworthy, and described the methods used in the recovery and transport of the ore to the shipping terminal. The speaker also spoke of the deposits of blue asbestos at Wittenoom Gorge, which is in banded ironstone of the Nullagine System, and the gold deposits at Pilbaro. This field opened in 1889, and in the following ten years some 26,000 tons of ore produced 160,000 oz of gold. Both his talk and the excellent selection of slides were appreciated by all who attended.

The meeting concluded with discussion on an unusually large number of exhibits, far too many to mention.

Marine Biology and Entomology Group

4 March

23 members attended this meeting, which was chaired by Mr. P. Kelly, in the absence of Mr. R. Condron.

Mr. McInnes reported on the outing to Ricketts Point with the Hawthorn juniors. In spite of the high temperature, there was a good attendance of members and quite a variety of marine life was obtained. A small specimen of the poisonous octopus Maculosa was found by one of the juniors, and created a great deal of interest; snapping prawns were also found, and cling fish.

Speaker for the evening was one of our group members, Mr. E. R. Lublin, who showed a wonderful collection of slides taken on a 5 months' trip last year to Central and Northern Australia. Mr. Lublin gave a very interesting running commentary on these slides, and all members enjoyed seeing them. A vote of thanks was moved by Mr. P. Kelly.

Exhibits

Miss Vanessa Gough showed a butterfly net which she had obtained from England, this net had an extensible handle, and would be a very handy one for insect collectors.

Miss White showed some unidentified moths, the larvae of which were destructive to Acacia.

Mr. McInnes showed the larva of a species of large Goat moth.

Mr. Strong showed two species of flies, as yet unidentified, taken at Point Lonsdale, also a very small limpet under a stereoscopic microscope.

1 April

Seventeen members were in attendance and Mr. R. Condron took the Chair.

Speaker for the evening was Miss E. Brough, Senior Teaching Fellow, Zoology Dept., Monash University, her subject being "Insect Communication". This proved to be a most interesting and excellently delivered talk. Many species of insects, with special reference to ants, were mentioned and elaborated on. Miss Brough explained the glandular system of an ant by means of a very good and clear diagram. Mention was made of the

chemical substance *Pheromone* which enables insects to communicate with one another, and the different types used for different sorts of communication such as danger, food, etc. Miss Brough said that if the death pheromone was painted on an ant, other ants would remove it from the nest although it was still alive.

We were also shown some 35 mm. transparencies showing secretions of pheromone and the secretion glands. At the conclusion of her talk Miss Brough was plied with many questions, and a vote of thanks was moved by Mrs. Z. Lee.

Exhibits

Mrs. Ramsden and Mrs. Garde showed a very interesting unidentified mealy-looking insect under a wide field stereoscopic microscope.

Miss Jenny Force showed a number of different species of insects which she had very ably mounted in plastic.

Mr. R. Condron showed a case of butterflies, beetles and moths. Included in the butterflies were a specimen of the Small Grass Yellow *Eurema smilax*, taken at Rosebud; he said that they had not been seen there for 20 years. Also two specimens of *Hypochrysops delicia delicia*, a species of the Lycaenidae family commonly known as the "Blue Jewel Butterfly", one of these was set in reverse, showing the beautiful colouring of the underside. Mr. Condron took these at the You Yangs, and said that this species was rare in Victoria.

Microscopy Group

17 January

Chairman Mr. D. M. McInnes. 8 members present. Mr. McInnes gave a short talk on the Plumatella, very well illustrated with two excellent specimens of this organism actively creating the wave movements by their cillia covered tentacles through which means a vortex is created in the surrounding water whereby their food is collected.

Exhibits under microscopes were as follows:

Marine. By Mr. J. Strong. *Galeolaria caespitosa.* Collected from sea water at Brighton, Vic.

Botanical Sections. By Carl Meyer.

1. Transverse section of grape stem, illustrating plasmolysis of cell contents.
2. *Juncus polyanthimus.* T.S. Combination of leaf and stem showing large amount of aerenchyma, collateral vascular bundles with caps of schlerenchyma.
3. *Laurus camphora.* T.S. Typical example of secondary thickening.
4. *Heptapleurum longifolium.* A transition species between Monocots and Dicots.

Pond Life. By Mr. McInnes.

1. Plumatella. *Polymorpha repins.*
2. Eggs of Plumatella. Statablasts.

21 February

Chairman Mr. J. Dawes. 16 members and three visitors present. Subject of meeting—Examination of Rock Sections by Mr. McInnes. Explaining the reason for making a section is to identify the minerals present, he then briefly described a method of making sections, also the several methods used in illumination of sections under microscope.

With the aid of Mr. E. Snell and his microprojector, several slides specially selected to illustrate basic crystal shape and other characteristics were projected onto screen; each slide was systematically explained then followed another series using polarized light, the reasons for doing so being explained progressively. The 22 slides exhibited were excellently prepared and the clarity of projected image is a tribute to both Mr. McInnes and Mr. Snell in their interesting effort in the cause of microscopy.

Exhibits

Under the 8 microscopes on table the following exhibits were seen.

Diatoms (Mr. R. Trotter)

1. Spiculets of Holothuria in Situ—mounted in glycerine.
2. Sponge spicules—Allyoirium and Gorgonia; Zanzibar.
3. Spiculets (Anchors) of Holothuria. Dark ground slide mounting.
4. Diatom *Bacteriastrum curvatum*; Manila Bay.
   Diatom (Mr. J. Milojkovic).
   Arrangement of Spicules. Zanzibar. (Ringed Stide Color tinged.)

Tecktites (Paul Harris)

10 specimens of various sizes found at Pt. Campbell, Vic. 1967-68.

Botanical Section (Carl Meyer)

Transverse section of succulent not identified.

The next meeting of Microscopy groups 17 April 1968.

F.N.C.V. DIARY OF COMING EVENTS

GENERAL MEETINGS

Monday, 11 May—General Meeting at National Herbarium, The Domain, South Yarra, commencing at 8 p.m.

1. Minutes, Reports, Announcements.
2. Correspondence.
3. Subject of evening—Medallion Lecture by Mr. G. Whitley.
4. New Members—
   (a) *Ordinary:*
   Miss J. Devenish, 7 Alimar Road, Glen Waverley 3150.
   Mr. M. J. Oldis, 25 Berrima Road, Rosanna 3084.
   Mr. K. P. Strong, 156 Orrong Road, Toorak 3142. (Interest—Microscopy.)
   (b) *Country:*
   Miss V. Hill, 6 Rangeview Avenue, Wangaratta, Vic. 3677.
   (c) *Junior:*
   Mr. N. Affilitto, 565 Church Street, Richmond 3121. (Interest—Microscopy.)
5. General Business.
6. Nature Notes and Exhibits.

GROUP MEETINGS

(8 p.m. at the National Herbarium unless otherwise stated)

Wednesday, 15 May—Microscopical Group.

Friday, 29 May—Junior meeting at 8 p.m. at Hawthorn Town Hall.

Monday, 3 June—Entomology and Marine Biology Group. This group meets in Mr. Strong's rooms in Parliament House at 8 p.m. Enter through private entrance at south end of house.

Wednesday, 5 June—Geology Group.

Thursday, 6 June—Mammal Survey Group; meets in Fisheries and Wildlife Dept. Rooms at 7.45 p.m.

Friday, 7 June—Junior meeting at Rechabite Hall, 251 High Street, Preston, at 8 p.m.

Thursday, 13 June—Botany Group.

F.N.C.V. EXCURSIONS

Sunday, 19 May—Dandenong Ranges. Subject: Fungi. Leader, Mr. J. H. Willis. The coach will leave Batman Avenue at 9.30 a.m. Fare $1.40. Bring one meal and a snack.

31 August-8 September—Grampians. The coach will leave Melbourne on Saturday, 31 August, and remain with party for day trips. Accommodation has been booked at Grampians House for those in coach. The excursion will cost $60.00 and a deposit of $10.00 should be paid when booking and the balance by the end of July, all cheques being made out to "Excursion Trust".

Field Naturalists Club of Victoria

Established 1880

OBJECTS: To stimulate interest in natural history and to preserve and protect Australian fauna and flora.

Patron: His Excellency Major-General SIR ROHAN DELACOMBE, K.B.E., C.B., D.S.O.

Key Office-Bearers, 1968/69

Acting President:
MR. E. R. ALLAN

Vice-Presidents: MR. JEFFS, MR. T. SAULT

Immediate Past President: MR. W. L. WILLIAMS

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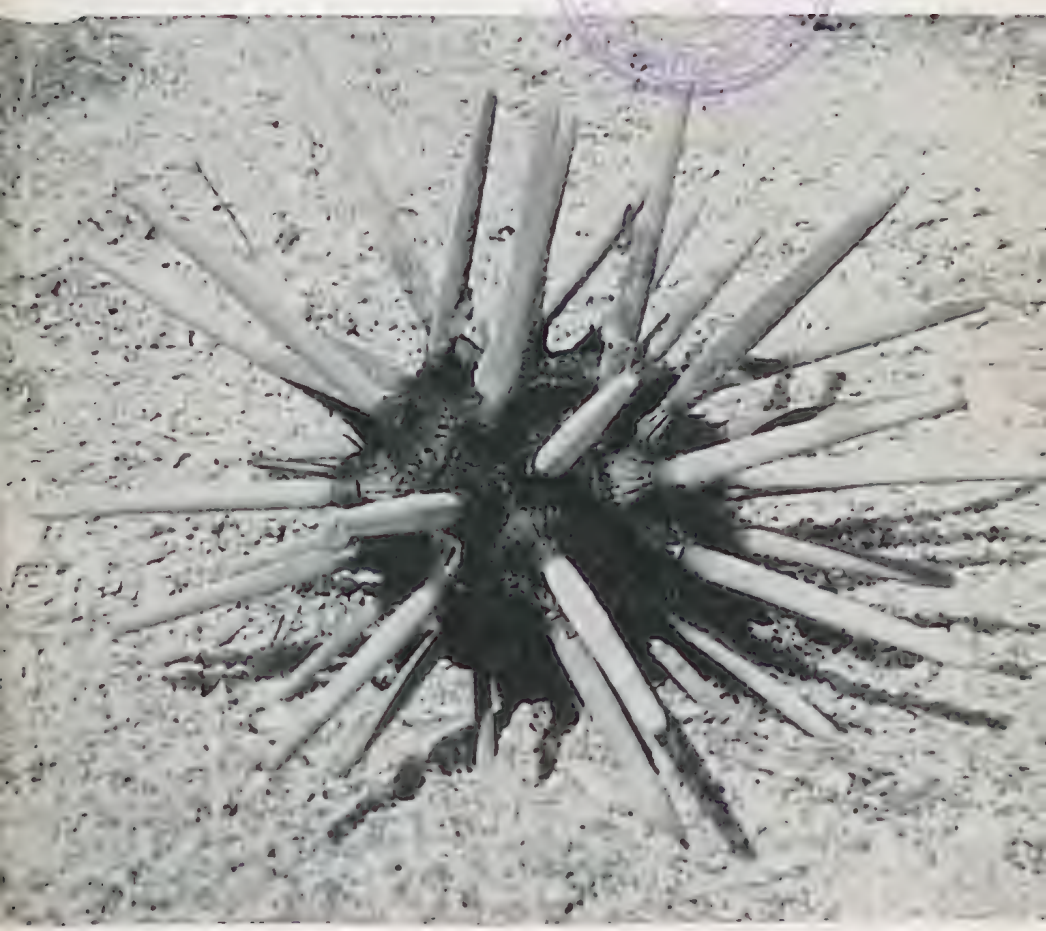

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Editorial

The Land Utilization Advisory Council, the Wildlife Reserves Investigation Committee, and the Westernport Co-ordination Committee are three of a number of impressively named bodies existing in Victoria, which are interested in the welfare of our natural resources from the point of view of conservation. Presumably they should have some degree of influence in keeping a balance between commercial development and landscape preservation. But just how effective *are* these bodies when they meet the pressures of large combines together with the snide operations of the PR men.

Where a choice may exist between full-scale commercial exploitation of an area, or a balance between this and retention of some of its aesthetical qualities; the scales appear to be heavily weighted on the side of the former.

This view seems to be supported by the increasing array of oil rigs with their ancillary equipment and buildings, being erected without much thought for the destruction of once-picturesque sections of the Victorian coastline—the proposals for development of vast shipping facilities around Westernport Bay—the haphazard subdivisional and tourist schemes occurring in bayside and other localities previously renowned for their natural beauty—and the quarrying operations which are scarring hillsides to the east and north-east of Melbourne, and parts of Lerderderg Gorge to the West.

It apparently matters little whether or not the government carries a Minister for Conservation, for in N.S.W., where Mr. Beal holds this office, there was no official attempt to safeguard the future or present welfare of the wildlife affected by the filling of a section of the Blowering Dam scheme. Also in that State, the Wood-chip Industry has become firmly established; and this means that wherever this industry operates, *complete* removal of *all* vegetation is effected.

Nor are these trends confined only to large scale projects. Local Government bodies in Victoria, from whom an example in regional conservation might be expected, have recently employed labour to clear roadside verges of mallee vegetation, merely to spend surplus drought-relief grants.

To further illustrate these disturbing facts, is the deplorable state of affairs with regard to the official declaration of an area as a National Park. An interminable lapse of time invariably occurs before this declaration is reached: and this is in direct contrast to the often short time involved in the passing of legislation for a scheme authorized or sponsored by the State Government, and which is connected with some form of financial gain.

Indeed, it would appear that the various advisory committees are formulated so as to be incapable of exerting any beneficial influence on major decisions involving exploitation of natural resources; and only when every possibility of potential source of profit has been explored, are the aesthetical qualities of an area considered.

On the other hand, if these bodies are able to exert influence over such matters, then surely the public should be made more aware of their successes.

However, at the moment they seem to be merely names, along with all the other scientific names and grandiose terms linked with conservation; and which unfortunately serve only to confuse the general public which after all is an integral part of the natural environment. But it is not we of the present who shall suffer from the pollution and rape of the countryside—it is the generations to follow who will pay dearly for our sins and omissions.

The Victorian Naturalist

Editor: G. M. Ward
Assistant Editor: P. Gahan

Vol. 85, No. 6 6 June, 1968

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Front Cover:

This photograph, taken by Alan Owen (now living in Broome, W.A.), is of the Slate Pencil Urchin *Phyllacanthus parvispinus*.

Zonation of Gastropoda at Peterborough

by Evan Rowlands

Some causes of zonation

Few habitats expose organisms to such extremes of conditions as that region between low and high tides—the littoral belt. As the tide retreats, inhabitants of this belt are exposed to the dessicating effects of the blazing sun and drying wind; showers of rain may temporarily immerse organisms in the cavities of a rock shelf; when the sea returns there is the incessant battering of surf.

The length of time that an organism on a rock platform will be exposed by the retreating tide depends upon its vertical distance above low tide level. Organisms near low tide level will be exposed for one or two hours in twelve; in the mid-littoral zone an exposure of perhaps four hours will occur; the upper half of the littoral belt may be exposed for as long as six hours in every twelve, especially in sheltered areas. As a result of this variation in exposure there is a progressive change in habitat variables from the lower part of the littoral belt to the higher. Now every organism is adapted to survive in a set of habitat conditions which is possibly unique for every species—its ecological niche. Within the littoral belt, some organisms are found which can tolerate long periods of exposure and others which can stand little. As a result of the varying length of exposure to which different parts of the littoral belt are subject, zones of organisms arise which change in composition with height above low tide.

The width of the zones so formed, the species present and their numbers depend on a number of other factors. The degree of surge and splash is important and this is determined by the direction of prevailing seas, local coastal topography and the slope of the shore. Vertical cliffs are subject to heavy, high splashes while slightly sloping rock platforms undergo a regular, gentler inundation. The nature of the surface of the shore is important also—sand, smooth rock and eroded rock carry different populations. Finally, seasonal changes affect zonation.

Selection of a rock platform

This article records the zonation on a rock platform in the littoral belt at Peterborough, Victoria, noticed in January 1967. This platform consisted of hard brown sandstone, extensively eroded into a surface of very numerous cup sized pits. It was sheltered from heavy surf by off-shore reefs and an adjacent spit. There were no loose stones or other debris on its surface. It was selected for study because it offered a large, plane area gently sloping upwards from the sea thus allowing a simple, clear zonation of species to develop, and enabling species counts to be made easily. (See photograph and diagram.)

Adaptation of the gastropods

It is not surprising that few organisms are adapted to the rigours of life on a rock platform. However one phylum, the Mollusca, has adapted

The hard brown sand stone platform at Peterborough, which was selected for this survey.

Photo: Author

with considerable success. Perhaps it would be more accurate to say that one class of the Mollusca is well adapted to the rock platform. This class is the Gastropoda—the one shelled molluscs such as the limpet, snail, cone shell and whelk. Only a few members of other classes are commonly present—the mussells and oysters of the two shelled Pelecypoda and the chitons of the Amphineura. Thus it turned out that the entire rock platform population in this particular place at Peterborough could be accounted for in terms of fourteen species of gastropod and one species of chiton.

Criteria of a zone

Inspection of the rock platform suggested four zones. Ideally a zone should be characterized by a species which is non-mobile (like a barnacle or an alga) and which has a narrow vertical range. The zone characterized by the seaweed, *Hormosira banksii,* met this criterion. But elsewhere on the platform, zones had to be characterized by the mobile gastropods. Nevertheless, these species frequently occupy characteristic zones and some observers report that each specimen occupies a permanent "home" depression in the rock from which it makes minor excursions of up to a few feet during periods of immersion and darkness.

With these limits in mind and the awareness that choice of boundaries is somewhat arbitrary, four zones were identified. Species counts were made at eight random points within each zone. The average number of each species present per square metre is recorded in the accompanying table.

The zones at Peterborough

The four zones may be described as follows. The heights given must be taken as very approximate.

ZONE 1. The Hormosira zone of the low littoral.

This was situated about 0·5 metre above low tide, and was characterized by *Hormosira banksii,* whose thallus resembling long strings of large yellow-olive beads, covered about 70 per cent of the platform. This part of the platform was heavily silted with sand, and molluscs were infrequent in it.

ZONE 2. The Patelloida zone of the low littoral.

Spanning about a quarter of a metre above the 0·5 metre level, this zone was characterized by the tall ridged cones of a limpet, *Patelloida altico-*

stata. These conspicuous limpets ceased to occur quite abruptly at their upper limit. Far more numerous in this zone than *P. alticostata* was the limpet-like Siphon shell, *Siphonaria diemenensis,* resembling a tiny Chinese hat. This species is not a useful zone indicator since it extended throughout the littoral belt, although it occurred in its greatest numbers in this zone. The Ribbed Top Shell, *Austrocochlea constricta,* with its white ribbed whorls also occurred in this zone and higher.

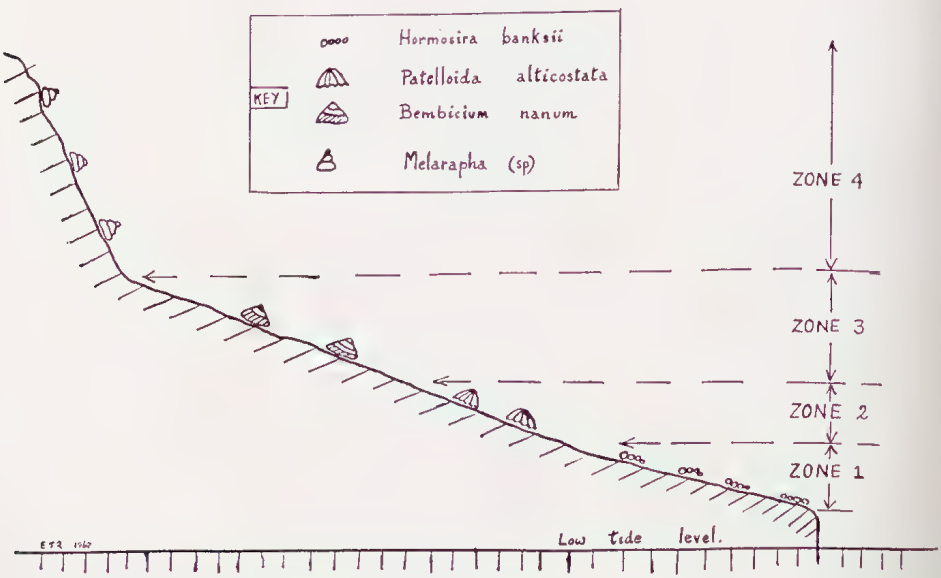
ZONE 3. The mid to upper littoral, 0·75-1·0 metre above low tide. This zone lacked a unique species. It took its character rather from the fact that it lay between the upper limit of *P. alticostata* in Zone 2 and the lower limit of the periwinkle, *Melarapha praetermissa.* However it was in this zone that the Conniwink, *Bembicium nanum,* reached its maximum density. Although not confined to this zone, it was noted rarely in the lower littoral and its numbers fell off toward high tide level. It was in this zone also that the black-green threads of the lichen, *Lichina confinis,* gave a dark colouration to the rock surface, and the tall cones of Cellana became prominent.

ZONE 4. The Melarapha zone. Upper and supra-littoral, 1·0-2·25 metre above low tide.

The appearance of the blue-grey spirals of *Melarapha praetermissa* indicated this zone. At its lower extremity, *Bembicium nanum* still occurred and a few specimens of *Lepsiella vinosa* appeared. *Malarapha unifasciata,* present in minute form and large numbers from mid-littoral showed here as larger specimens which persisted for several metres above high tide level.

Inconspicous inhabitants

The most conspicuous species of the rock platform have been described and in this instance the noticeable species were not present in large numbers. Not until the rock face was examined



Schematic diagram of zones mentioned in text.

closely was it seen that incredible numbers of minute gastropods covered most of its surface. *Melarapha paludinella,* like specks of black coal dust appeared at the rate of about one quarter million per square metre. The slightly larger brown shells of *Melarapha unifasciata* covered most of the rock face from mid-littoral to the supra-littoral at the rate of 75,000 per square metre. In all, each square metre of rock face was the site for over 3,000,000 specimens!

Some notable absentees

There were some interesting absentees from this platform, particularly chitons and anemones. This was probably due to the particular position and topography of this platform, since fifty metres away on an exposed vertical cliff, anemones occurred at the rate of 20 per square metre and chitons at 8 per square metre.

Conclusion

Sufficient has been said here to caution any who would generalize from the elementary observations recorded. Generalizations about the ecology of the seashore can only be made after many years of careful observations. The equilibrium between species and environment is one of infinite variation. It is one the field naturalist can study with pleasure and profit.

TABLE 1

Average numbers of Gastropoda per square metre by species.

Species	Vertical height above low tide			
	Zone 1 Approx. 0·5 m.	Zone 2 0·5-0·75 m.	Zone 3 0·75-1·0 m.	Zone 4 1·0-2·25 m.
Siphonaria diemenensis	2	1100+	110	2
Patelloida alticostata	0	9	0	0
Austrocochlea constricta	0·25	9	7	4
Cellana tramoserica	0	2	3	0
Bembicium nanum	1	1	47	32
Cominella lineolata	2	0	0·25	0
Lepsiella vinosa	0	0	0	5
Melarapha paludinella	Black, minute; extends throughout the entire range. Estimated at 250,000 per square metre in the upper littoral.			
Melarapha praetermissa	0	0	0	200+
Melarapha unifasciata	0	Young, minute individuals cover the rock shelf. About 75,000 per square metre in the mid littoral zone.		

A Note on Rock Rivers

by D. LYNDON

The huge mound of rocks shown in the photograph is the lower end of one of the "rock rivers" on Mount Wombargo, near Wulgulmerang in Eastern Victoria. Extending from half to three quarters of a mile, particularly on the west side, these rivers are an outstanding feature of the mountain. The Wombargo Range is part of the Snowy River Volcanics, which extend from Black Mountain to the Cobberas, and contain massive formations of rhyodacite thousands of feet thick. This material was ejected with great force as white hot tuff which in certain areas, e.g. Wombargo, Cobberas, cooled into columnar masses similar to those more usually found in basalt formations. This rhyodacite is an attractive red colour in which quartz phenocrysts show up clearly.

The geological map of the area shows a number of "periglacial rock rivers" and it is thought that these were formed in the Pleistocene age in periods of extreme cold, when the columnar masses were split by the freezing and thawing action into smaller blocks or spalls. Ice forming in the spaces between the spalls would press them outwards and would also lubricate their passage downhill. The process stopped when the climate became more moderate, leaving the sides of the ranges streaked by these peculiar "rivers" of thousands of tons of rocks. As the spalls are in fairly large blocks with practically no fine material to give roothold for plants, the course of a "rock river" is stark on the ground and is very easily followed.

This area has been described recently by Dr. J. A. Talent.

A section of the Wombargo Rock River.

Photo: D. Lyndon

Readers' Nature Notes and Queries

These columns are available for all members, young and old, to bring before others their own observations in nature. Correspondence may be sent to the Editor, 54 St. James Road, Heidelberg.

Ants win the Battle

This interesting note comes from Miss L. Young of Toorak.

We all know how savage the imported English Black Honey Bee is.

Two years ago a colony of these bees took possession of a telephone cable box set in the footpath of Devon Street, Ivanhoe. They built combs and stored honey. Last January it was noticed that Argentine ants (*Iridomyrmex humilis*) were making their way under the cover of the cable box, several columns in countless thousands marching three abreast. Two days later the bees left the box and swarmed on a rose bush in a garden on the opposite side of the street. The nightly army of ants had driven them out. It was not a seasonal or natural swarm as there were no drones in it. Twenty-four hours later the ants had cleared the cable box of all the stored comb and honey.

Kookaburras' Bedtime

From Mrs. Lyndon of Leongatha comes this description of a family of Kookaburras.

Opposite our front gate, and just above our bedroom window, a family of Kookaburras camp each night in one of the big old pines in the school ground. Like children when they are sent to bed, they indulge in a play period with much fun and games and not a little hilarity. A laughing session begins about eight o'clock each evening, sometimes a little earlier or later, but quite regularly. They flip from limb to limb amid peals of hearty laughter, interspersed with cosier interludes of hooting and wheezing in gravelly voices. We enjoy all this ourselves, and find that just the suggestion of a "hoo-hoo-hoo" sets them all off again with renewed vigour. About 8.15 p.m. there is another session, shorter this time, and about 8.30 a final blast; with all members of the orchestra contributing different sounds like a part-song. The noise rings over the town and through the TV programmes loud and clear. This pattern continued from the end of November until mid February, and we hope it will continue.

But alas, in the wee small hours, at picaninny dawn, the whole ear-splitting chorus begins again; and somehow we do not enjoy it quite so much!

Here are another two excerpts from the travel notes of Victor Jacobs.

Nelson (Mouth of the Glenelg River)

Many Black Swans were feeding on the estuary when we arrived here in January 1967, and Silver Gulls and large flocks of Red-capped Dotterels were feeding on the edge of the ocean and the river.

The coastline immediately east of Nelson is bordered with a thick scrub that is immediately distinctive in that it lacks eucalypts. The predominant tree is *Melaleuca pubescens* (Moonak), but other species are common. Thickets of Golden Wattle were interspersed with African Boxthorn and *Bursaria spinosa*. The latter was massed with white flowers and swarms of flies surrounded them. Elderberry was in fruit, and I saw a Woolly Tea-tree for the first time. The thick scrub is an ideal habitat for small birds but not quite so good for the bird watcher. The many Yellow-winged Honeyeaters were easy to see, and a little patience was rewarded by the sight of Red-browed Finches, Grey-backed Silvereyes, Ravens, Magpies, House

Sparrows, Goldfinches and Starlings. As I waited I heard a Rufous Bristlebird calling; and a party of Blue Wrens worked its way around me, the young males especially unafraid as they bounced along within feet of my shoes.

Wannon Falls

Although summer time, a stream of water fell from the crescent rim to the tangled mass of rocks below the falls, and lazily ran to spread out at the bend of the Wannon River some quarter of a mile down stream. I spent a couple of hours at this point descending and climbing the valley. Not all the time was occupied with bird watching, as I had been collecting seed on vacation and this year the wattles had been prolific with their fruits.

Magpies, Blue Wrens, Brown Thornbills, Goldfinches, Grey Fantails and one White-throated Tree Creeper were among the first birds seen. It was difficult to move silently as the ground was littered with bark and each puff of wind dislodged more.

A strange sound in the sky drew my attention to twenty or so Long-billed Corellas heading towards their feeding grounds. The difference between their call and that of the Sulphur-crested Cockatoo was demonstrated when five of the latter followed them at a short distance. Below, two Black Swans landed on the river. Yellow-winged Honeyeaters preened in a large Red Gum, while Red-browed Finches worked around them, and two White-eared Honeyeaters flew past. A Brown Goshawk left the ground and returned my stare from the next tree. At river level I recognized a large flock of White-naped Honeyeaters by the red orbital band, but as usual a number of birds eluded me. From a huge Sweet Bursaria (30 feet high at least) at the river's edge, a hidden family of Scrub Wrens scolded me. The melodious calls of Yellow-winged Honeyeaters were clearly audible from the hill above. A young Grey Fantail attempted to perch on my head, so deciding that I had stood tree-like for long enough I returned to camp. I am certain that any ornithologist with a wider background than mine would have recorded another half-dozen birds at least.

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Ferns of Castle Rock Gorge

by I. R. McCann

(Photographs by Author)

Castle Rock is a mass of contorted sandstone, which dominates the western slopes of the Victoria Range in the Grampians. Its walls rise sheer for hundreds of feet. It towers above the Honeysuckle, Deep, Hut, and Cultivations Creeks, and broods over the Billiwing area, in which such a large number of aboriginal paintings sites have been discovered. An anthropologist, Mr. A. Massola, who has recorded and studied most of these new aboriginal shelters found in the past twelve years, has suggested that this locality was sacred to the lizard totem, the "Burti Ngan-ap" of the Buandik people and was chosen "because of the towering and distinguishing pile of Castle Rock". (*Victorian Naturalist,* Volume 75, number 5.)

The huge eastern wall of Castle Rock is split from top to bottom. It is just possible to edge your way along the narrow erratic course of this fissure, for about forty yards, to enter a ravine deep in the heart of the mountain.

This ravine, some hundreds of feet deep, and nowhere more than a few yards wide at the bottom, contains one of the most remarkable plant communities in the Grampians.

It is a garden of ferns. The damp rock walls and the trunks of the Soft Tree-ferns are green with the dainty fronds of no less than four species of Filmy-ferns; only one, the Common Filmy-fern, is found elsewhere in the Grampians. Filmy-ferns, whose delicately soft and translucent fronds are but a single cell thick, have been aptly described as "the fairies of the fern world".

Finger Fern is another luxuriant species not found elsewhere in these mountains. Spleenworts, Shield-ferns, Bat's-wing Fern, Necklace Fern and

The Finger Fern (*Grammitis billardieri*)
(This was growing on a Soft-Tree-fern trunk with Common Filmy-fern)

Common Filmy-fern
(*Hymenophyllum cupressiforme*)

Kangaroo Fern are other species covering the rocky floor and filling wall crevices.

The narrowness of this great gorge, its depth and direction, have produced in it a unique micro-climate. Airborne spores, carried for perhaps hundreds of miles, have settled and germinated to produce this place of entrancing beauty and botanical interest.

The following fern species have been recorded from Castle Rock Gorge:

Hymenophyllum cupressiforme
Common Filmy-fern

Mecodium flabellatum
Shiny Filmy-fern

Mecodium rarum
Narrow Filmy-fern

Polyphlebium venosum
Veined Bristle-fern

Dicksonia antarctica
Soft Tree-fern

Histiopteris incisa
Bat's-wing Fern

Grammitis billardieri
Finger Fern

Microsorium diversifolium
Kangaroo Fern

Asplenium flabellifolium
Necklace Fern

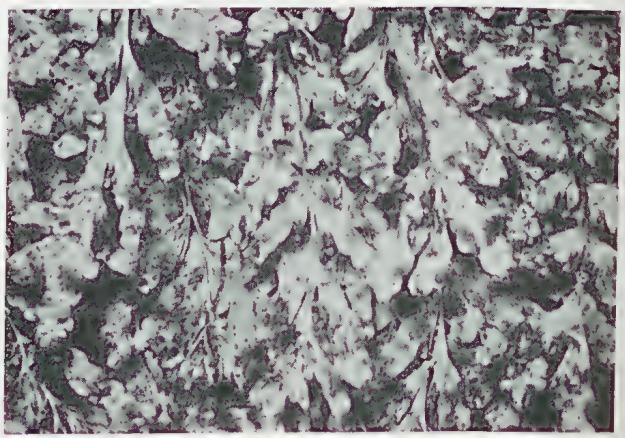
Asplenium bulbiferum
Mother Spleenwort

Rumohra adiantiformis
Leathery Shield-fern

Polystichum proliferum
Mother Shield-fern

Acknowledgement

I am indebted to Mr. A. C. Beauglehole for his assistance with identifications and for confirmation of the records listed.



Veined Bristle-fern (*Polyphlebium venosum*) growing on wall of Castle Rock Gorge.

Radiocarbon Dating

by Edmund D. Gill*

From outer space there is a continuous rain on the earth of all manner of particles. This "cosmic radiation" was discovered in 1911. We are protected from it by the atmosphere above us. The radiation causes changes in the atmosphere, and one of these is to change nitrogen atoms (atomic weight 14) into carbon atoms (atomic weight 14). There are two differences between ordinary carbon atoms and those caused by cosmic radiation. Ordinary carbon atoms are lighter (atomic weight 12), and those formed in the upper atmosphere are radioactive. The radioactive carbon formed in this way unites with oxygen in the atmosphere to form carbon dioxide upon which plants live. Because animals live on plants, the radioactive carbon becomes distributed through them also. You and I and all living things thus contain radioactive carbon.

The amount of radioactive carbon in living things has altered in recent centuries. First of all it was diluted by the coming of the Industrial Revolution. This led to the burning of immense quantities of fuel such as coal that had lost its radioactive carbon. Thus vast quantities of carbon-dioxide were poured into the atmosphere and because it lacked radiocarbon it diluted the amount in the atmosphere. In more recent times the burning of oil and petrol, which are also fossil fuels, have likewise diluted the amount of radioactive carbon in nature. However, in recent years the atmosphere has been greatly enriched in radioactive carbon by atom bomb explosions. These explosions release enormous numbers of neutrons which change nitrogen into carbon in exactly the same way as the natural cosmic radiation does in outer space. The increase in radioactive carbon in the atmosphere and so in living things in recent years has been very rapid. In Melbourne, as in many other centres of the world, carbon dioxide is regularly collected from the atmosphere in order to keep track of the level of radioactive carbon in the atmosphere. After every atom bomb test in the atmosphere, the rise in radiation can be traced. Apart from any other reason, it is necessary to keep track of these changes in order to be able to continue satisfactory radiocarbon dating.

Invention of Radiocarbon Dating

Professor W. F. Libby of U.S.A. concluded that radioactive carbon must exist in nature, so searched for it and found it. He worked out the half life of radiocarbon as being of the order of 5,600 years, i.e. if there were a sample of one gram of radioactive carbon formed 5,600 years ago, there would now remain only half a gram, and in the next 5,600 years half of what remains would disintegrate. Professor Libby then had the brilliant idea of using this radioactive breakdown as a clock for measuring the ages of objects only thousands of years old. There already existed applications of radioactivity for measuring minerals millions of years old, but a clock for measuring much shorter periods of time was needed. He checked his

* Assistant Director, National Museum of Victoria. This article was written by editorial request.

method by taking samples of known age and seeing how the radiocarbon age compared with the known age. The dates were quite close and so he was encouraged to continue with the refinement of this new method of dating. His No. 1 sample was an acacia wood beam from the tomb of Zoser at Sakkara in Egypt. He obtained a date of the order of 4,000 years for this beam which was known to be about 4,650 years old. In principle, Professor Libby's method was to burn the wood until it was reduced to carbon, which was spread on the inside of a tube. The air was removed from the tube and then the number of radioactive disintegrations per minute carefully counted. As the number of disintegrations per minute for present day carbon was known, and the rate of breakdown of radioactive carbon to non-active carbon was known, it was possible to calculate the approximate age of the specimen. Since that time an enormous amount of work has been done to refine this very useful scientific tool. Nowadays instead of solid carbon, some gaseous form of carbon (such as carbon dioxide) is used. The advantage of the gas is that it spreads itself evenly through the tube and so makes possible a more accurate count. It is also easier to purify the gas, to control it, and to measure it.

There are now numerous radiocarbon laboratories throughout the world, and many of these have multiple counters so that they can treat a large number of samples. There are three radiocarbon laboratories in Australia, one of which is in the Institute of Applied Science in Melbourne.

Radiocarbon Dating in Victoria

The first sample from Victoria to be dated by radiocarbon was a charcoal from an aboriginal midden on an ancient shoreline some three quarters of a mile inland from the present coast and on the north side of a dune ridge. The site is at Goose Lagoon, four miles west of Port Fairy in Western Victoria (Gill, 1955a). The sample was assayed by Professor Libby and he obtained by the solid carbon method a date of 1,177 ± 175 years B.P. (equals before present, taken as 1950). The midden at this site is of the kind found commonly along the coast including the coast from Port Fairy to Goose Lagoon. The site is a sandy one and the midden material consisted of charcoal and marine shells from the coast. At that time, it was not thought that the aborigines did not carry shellfish from the coast, but always ate them near where they were collected. So this site meant that either this idea was incorrect, or the midden belonged to the time when the sea was in the Lagoon and formed the small cliff to be seen at this site. If the latter were true, then the aborigines had a much greater antiquity than was at that time thought to be possible. Professor Libby's date showed that the midden had been occupied in comparatively recent times. Later, when the method of radiocarbon dating had been greatly refined, a new assay was done in order to check that early dating. The date so obtained was 1,855 years (Y-150-1). It was thus shown that the aborigines did sometimes carry marine shells quite a long way inland before eating them. The site at Goose Lagoon is on the inland side of a high ridge which would give it protection from the cold winter south and south-west winds, and this may be the explanation of the meals being taken at this particular place. On the other hand, this site may have been preferred for some other practical or mystical reason. Since then a number of sites has been found some distance inland

where sea food was eaten. Some such places are in the Tower Hill Volcano, which is a recent one, and so no explanation of old shorelines is possible. The radiocarbon dates obtained so far indicate a probable age for the Tower Hill eruption of between 5,500 and 6,000 years before present (B.P.). Aboriginal sites above the tuff from the Tower Hill Volcano have dated up to 5,120 years, while a site with midden materials and a basalt axe from beneath the tuff at Bushfield, north of Warrnambool, gave a date of 6,600 years. Radiocarbon assays have brought into perspective the antiquity of the aborigines by dating, with a refinement never possible before, the various localities that have been discovered in Victoria. Older than the Bushfield site are those of Green Gully Man and Keilor Man in the Keilor district north-west of Melbourne. In the yellow sediments of the same terrace of the Maribyrnong River, sites up to 18,000 years have been discovered. The deposit 18,000 years old is a lens-shaped midden with burnt ground underneath and in the upper part dispersed charcoal in random orientation (i.e. not water laid) and pieces of bones of food animals. The time is about that at which the sea was lowest during the Last Glaciation. So while the ocean was gradually rising again and encroaching over the land, the sediments of the Maribyrnong River was being laid down to form the Keilor Terrace, enclosing within themselves a record of the aborigines that lived in the valley.

Below the yellow sediment containing the Keilor Cranium Dr. Alexander Gallus found a clay deposit with bones of extinct animals and charcoal which yielded a radiocarbon date of 31,600 years. Chipped stones have been found in the clay which he believes are aboriginal implements, while others think that they have been chipped by torrents. The red and grey clay appears to be material that slumped into the channel of Dry Creek shortly before the building of the Keilor Terrace began.

When the Keilor Terrace is followed downstream, it gradually disappears below the deposits of the Yarra Delta. It is graded to a sea level far below the present, indeed to a time when Port Phillip was dry and the shoreline was out in Bass Strait somewhere. The climate was then colder, because the sea was lowered by the greater precipitation of ice and snow on the Poles and on high mountains. The rainfall was greater, because the river flooded far higher than it ever does now, and did so commonly, as is shown by the building of the sediments without formation of soils.

Materials for Radiocarbon Dating

All radiocarbon dates are not of equal value. If a sample is contaminated, it gives an incorrect date. Sometimes a sample is chosen that does not date what it is supposed to date. One of the chief problems of the radiocarbon method is to know precisely what is being dated. The carbon of wood, peat, charcoal, and such materials, is the most reliable because the most stable. Less reliable is the carbon in carbonates, such as the carbonate of shells. The mineral concerned is very soluble and so exchange can take place, old carbonate being replaced with new, thus diluting the age. However, if the geochemistry of a site is understood, carbonate can be employed. In many places there is nothing else, and so the best has to be made of what is available. There is a helpful principle here, which is that if the carbonate has been replaced by more recent carbonate, then this will make the age younger. A carbonate age therefore is practically

always a minimal date. This is in itself useful information.

We may illustrate this reliability of dates by pointing out that the date of 18,000 years for the midden low in the Keilor Terrace near Melbourne is a satisfactory date because the dating was done by a reliable laboratory on a large sample of charcoal collected from one small, defined stratum. In the category of the less reliable may be placed the date of 13,700 years for a large number of *Coxiella* shells from the site with bones of extinct marsupials on the east side of Lake Colongulac in Western Victoria. First of all, the shells are part of the beach deposit, and so it is possible that some older shells were included in the deposit along with the ones that were washed on to the beach from snails that had just died. A study of deposits of such snail shells washed on to the present beaches shows that such contamination is unlikely, but it can occur. As the shells are made of carbonate, any leaching will result in removal of some of the original carbonate and its replacement with some that is more recent. For this and other reasons the date is minimal. Thus the date of 18,000 years for the site at Keilor can be concluded to be reliable, while the date at Lake Colongulac may well be too young. All we can say is that this is a minimal date and that it gives an approximate order of age. A plan has been devised for checking these radiocarbon dates on sites around the Western District lakes, and from this should be determined how reliable the dates are that have been based on carbonate through lack of other material.

Radiocarbon Dating and Research

Radiocarbon dating is expensive because it involves a very accurate count of a very low level of radioactivity. The most abundant concentration found is that in living things of the present time, but the concentration there is only 10^{-12}, i.e. there is one radioactive carbon atom for every million millions of non-active carbon atoms. As a sample (such as a piece of wood) gets older, the concentration becomes less, so that its measurement is a greatly refined scientific technique. This is what makes it expensive, and in spite of all the counting that is done at the present time, the cheapest rate at which a radiocarbon date can be obtained is $50. For good dating, one should not get isolated determinations (as we so often have to do), but obtain a series of self-checking dates. Much more rapid progress could be made in a number of fields of research if the money were available for ample radiocarbon dates. This aspect is mentioned because samples are often sent to the National Museum for dating and people are disappointed when told that this cannot be done. Because of the cost, a careful order of priority has to be observed in choosing samples for assay.

References

Gill, E. D., 1955a. Aboriginal Midden Sites in Western Victoria Dated by Radiocarbon Analysis. *Mankind* **5**: 51-55.

Gill, E. D., 1955b. Radiocarbon Dates for Australian Archeological and Geological Samples. *Aust. J. Sci.* **18**: 49-52.

Libby, W. F., 1955. Radiocarbon Dating, 2nd Ed. Univ. of Chicago Press, 175 pp.

Polach, H. A., and Golson, J., 1966. A collection of Specimens for Radiocarbon Dating and Interpretation of Results. *Aust. Inst. Abor. Stud.* **2.**

Honey Dew from *Cymbidium canaliculatum* (Orchidaceae)

by J. Ros. Garnet

During November 1967, a plant of the epiphytic orchid, *Cymbidium canaliculatum,* produced four long flowering spikes each with from thirty to forty flowers.

In addition to the two or three bracts on the rachis, each floral pedicel is subtended by a tiny bract and it was of interest to note that a globule of clear, colourless, sweet-tasting fluid exuded from the rachis at the points of articulation of each of the bracts, and the pedicels and the rachis.

One of the flowers was pollinated by an unknown agent and rapidly developed a large, turgid seed pod. From its surface, too, the same sweet-tasting "honey dew" exuded continuously until the seeds within the pod ripened.

From these several sources the exudata was so abundant that there was no difficulty in collecting it by means of a hypodermic syringe and needle. By the time the flowers had withered and the pod had ripened, some five or six weeks later, I had managed to accumulate about 0·5 ml. of the liquid in a small tube. Its collection was a regular occupation practically each morning throughout the flowering period.

One day, unhappily, I left the tube on the bench in the glass house and an army of "Argentine Ants" (*Iridomyrmex humilis*) discovered it and devoured the whole of my patiently collected harvest. They removed all traces of exudate from the plant as well.

By good fortune, the Cymbidium responded very favourably to the drought conditions and exceedingly hot weather obtaining at the time by sending up three fresh flower spikes in January, 1968. A second plant also contributed a spike so that I was favoured with a further supply of material.

The hot days of January and February appeared to stimulate an even more copious flow of sugary liquid, so I was able to replace the loss brought about by the marauding ants. The volume of new harvest, added to day by day and kept out of their reach, gradually mounted and, if evaporation had not caused a substantial degree of concentration, there would have been about 3 ml. of the exudate. Instead, as a result of the succession of hot dry days, the tube finally held about 0·75 ml. of clear, viscous and almost colourless fluid resembling commercial glucose in appearance and viscosity.

From time to time evaporation led to crystallization of the liquid but each addition caused the solid to again liquefy.

Four of the five senses are useful aids to the identification of substances but, although one of them, taste, indicated that the exudate was sugary, it could not tell me which of the dozens of sugars were present.

Chemists recognize several classes of them—mono-, di-, tri-, tetra- and polysaccharides—and all of them belong to the class of substance known

generally as carbohydrates. Not so many years ago it would have been a very laborious task and one which would not necessarily have yielded a conclusive result to analyze my small sample but, nowadays, with the aid of a technique known as chromotography it is possible to conduct an analysis expeditiously and without a great deal of labour to identify the components of even a minute sample.

My sample was examined by this technique and found to be composed of practically equal proportions of saccharose, D-glucose and D-fructose together with a small proportion of glucosamine which latter is a common break-down product of a number of plant (and bacterial) polysaccharides. The composition of the mixture was, in fact, almost the same as that of honey.

Saccharose or "cane sugar" is one of the commonest of the sugars derived from plants. D-glucose, known also as dextrose or "grape sugar" is another well known plant sugar best known as a component of grape juice and sweet corn. D-fructose or laevulose is commonly called "fruit sugar" because it occurs in fruits and fruit juices.

Both D-glucose and D-fructose are derivable from saccharose by a process of hydrolysis or "inversion" and, hence, it is quite reasonable to infer that the original exudate may have been predominantly the disaccharide saccharose a proportion of which, in the presence of certain other trace components, would have been hydrolysed into "invert sugar"—a mixture of the two monosaccharide hexose sugars, D-glucose and D-fructose.

There is nothing unusual about these three sugars. They are all common components of plant juices and, in one form or another, contribute to the composition of the main food of the hive bee—the nectar of flowers.

The main purpose of reporting the matter at all is to record the composition of the "honey dew", to draw attention to the source of the material and to note an unusual phenomenon—the profuse flow of nectar, not from the flowers of the orchid but from the floral rachis and the seed pod.

No sign of exudate could be detected on or within the flowers but I have noticed droplets on the tips of growing leaves of another leathery-leaved epiphytic orchid—*Dendrobium speciosum*—but it never occurred in sufficient abundance to make it worth the trouble of collecting and analyzing it.

In the light of the above facts it is not surprising that the sizeable pseudobulbs of *Cymbidium canaliculatum* were utilized by the Australian aboriginals as a minor source of food. The plant is, perhaps, one of the commonest of epiphytic orchids in northern New South Wales and Queensland, distributed over such a wide area and variety of habitat that, in days gone by, even as at the present time, it would have been easy to locate although not so easy to obtain because, so often, the plants are to be seen only high up in the angles of branches or in the spouts of tall eucalypts or, occasionally, casuarinas.

Judging by their size, some of these "wild" cymbidiums must be very old plants and some of them would weigh easily half a hundredweight. One plant of such a dimension as that, during its growing season, could furnish carbohydrate refreshment for a family.

F.N.C.V. Excursion to Broken Hill (Aug. 1967)

by E. B. KING

The party, consisting of 39 members, departed from Melbourne by coach at 9 a.m. on the 31st August, 1967. Some members with their own transport, joined the excursion in Broken Hill.

The route was via the Calder Highway to Kyneton, where the first stop was made, the weather being very cold, but fine and sunny. Lunch was taken at Bridgewater in a pleasant reserve on the banks of the Loddon River. The river banks were lined with splendid River Red Gums (*Eucalyptus camaldulensis*) and the "birdos" were rewarded with sightings of miners, magpies, rosellas, galahs, honeyeaters, swallows and water hens.

A feature of the countryside as we drove northwards, was the many acacias in bloom, and the interesting salt marsh flora in the Sea Lake and Lake Tyrrell areas.

The mallee forest, interspersed with brilliant *Acacia rigens, Cassia artemisioides, C. stuartii* and *Olearia pimeleoides* beautified the roadsides. Unfortunately, clearing and burning of this very lovely natural avenue by a State Authority was evident. Some thought of greater conservation of this ever diminishing vegetation should be given, as the district is now mainly given over to large wheat acreages.

The party arrived at Mildura in the late afternoon, and was accommodated at the Mildura Motel overnight. A member of the Sunraysia Naturalists Club, Mr. Tom Henshall of Red Cliffs, called at the motel to talk with old friends, and then escorted some of the party to inspect the new club rooms made available to them by the Mildura City Council.

On Friday, 1st September, starting at 9 a.m., and after stopping in the large and prosperous shopping area to replenish depleted lunch boxes, a tour of Mildura was made, taking in the Murray Bridges and the Buronga tomato growing area. Then on to Wentworth to inspect the old gaol, which, although unfortunately closed, was picturesque enough for the camera enthusiasts.

A member of the party, Mr. Douglas, a resident of the area for many years, pointed out a cairn erected to commemorate the valuable work done by a small tractor in building a levee bank, thus saving the township from severe flooding in 1956.

The Darling joins the Murray here, and the banks are profusely lined with Red River Gums, Black Box and Willows, while Saltbush and Bluebush predominates on the surrounding dry and salty plains.

The trip to Broken Hill covers a distance of 172 miles, along a good bitumen road, except for 40 miles of good gravel surface after leaving Wentworth. Throughout this area, extreme drought conditions were evident with lakes and waterholes, showing expanses of cracked, grey mud and creeks with dry, sandy beds, although relieved somewhat of their aridness by the ubiquitous River Red Gums.

A number of private air-fields belonging to station properties were seen, and many tanks with their flocks of sheep, galahs and corellas. Apparently the only habitation along this route is a service station approximately halfway to Broken Hill.

Two stops were made, the first at

Lake Popilta for lunch. The area appeared barren of interest with scattered Murray pines and *Caruarina cristata* scrub, but members were soon "botanizing" and managed to discover a great many plants for such an unlikely spot. Those noted were Australian bugle (*Ajuga australe*), Native tobacco (*Nicotiana sauvoleons*), Hop-bush (*Dodonaea attenuata*), Native pear creeper (*Marsdenia australis*), Poached-egg daisy (*Myriocephalus sturtii*), and a species of Twin-leaf (*Zygophyllum apiculatum*).

Pine Creek, a wide, sandy watercourse, completely dry, notable for the magnificent River Red Gums was the second stop. Three varieties of Helichrysum, *Swainsona swainsonioides* and the Native hollyhock (*Lavatera plebeja*) were also found here.

The vegetation across these plains is interesting in the fact that it appeared to grow in strips, with stands of casuarinas, mallee, she-okes and acacias dominating the landscape without any ecotone areas. For 30 miles or so before reaching Broken Hill, wide, treeless, saltbush plains were traversed, and as a strong wind was blowing, many "willy-willies" of swirling, red dust were encountered.

Late in the afternoon, Broken Hill appeared with the poppet heads and the "skimp" dumps of the mines, breaking the skyline. With a minimum of trouble, the large party was soon settled into their rooms at the Grand Private Hotel, due mainly to the efficient organization of our Excursion Secretary, Miss Marie Allender. Several members of the Barrier Field Naturalists Club were waiting to welcome our party and kindly offered any information needed.

Saturday morning was free of any scheduled outing, and many members took the opportunity to explore the city, with its many attractive parks, busy shopping areas and historical buildings and churches. The majority of the older houses are constructed of patterned galvanized iron with iron lace trims and others of natural stone, generally neatly kept, with gardens and trees planted along the streets. A brilliant display of the Sturt Desert Pea (*Clianthus formosus*) was growing on the footpath of one street and another in a private garden and was much admired and photographed. Many of the older hotels were of the typical "old bush pub" architecture and had names reminiscent of Broken Hill's earlier days, such as "Silver King", "Willyama", "Bonanza", etc.

A tour of the city area was made on Saturday afternoon, taking in a visit to the Zinc Corporation Park, a veritable green oasis, with twin man-made lakes, native trees and shrubs. Many fruit trees were in blossom and a hedge of Old Man Saltbush (*Atriplex nummularia*) growing to approximately 8-10 feet high created much interest.

On Saturday night, Mr. and Mrs. Speering, of the Barrier Club, made their home available for a showing of slides with a commentary, entitled "The Birth of Broken Hill". All present found this well presented documentary of great interest and a very good introduction to the district. The Barrier Club members served a delicious supper afterwards and a much appreciated gesture was the presentation of a spray of the beautiful Sturt Desert Pea to all Melbourne visitors.

On Sunday, the Barrier Club was our guide on a trip to the Mootwingee Ranges, a Wildlife and Flora Reserve, 82 miles north of Broken Hill. The large party consisting of two buses and many private cars, set out along a dusty, gravel road, which wound across typical desert countryside. Although drought-stricken, it was not lacking in interest, as emus, kangaroos,

and wedge-tail eagles were seen. A stop was made at the Yanco Glen Hotel, some 20 miles from Broken Hill and here an extensive collection of aboriginal artifacts and old bottles were displayed. A little further on, a halt was made to examine a stand of Leopard trees (*Flindersia maculosa*), which are of botanical interest as they are a survival of a type of flora now extinct in this area. This tree has an unusual manner of growth in that it at first grows as a bramble bush to approximately 5-6 feet high, then a shoot, which becomes the actual tree, appears at ground level; the bramble eventually dying off as the tree matures.

Despite the prolonged drought, a number of species of plants were found to be flowering in the roadside depressions and particularly noted were eremophilas, billy buttons, helipterum, barbata lily, and the Darling hop.

An unusual feature of the landscape was the vast areas covered with small, white quartzite pebbles, giving the appearance of a recent, heavy hailstorm. This is due to the weathering of the softer rocks leaving a residue of the harder quartz.

As the Ranges are approached, it is very evident that the country has suffered from over-grazing and very little of the natural flora remains. Most of the trees are dead or dying in the deep, red sand drifts and the only green vegetation were clumps of two exotics, the Mexican poppy (*Argemone mexicana*) and "Salvation Jane" (*Echium plantagineum*).

On reaching Mootwingee, lunch was prepared, with the Barrier Club members boiling the billy, and afterwards, Mr. Baker was our guide on a walk to the Snake Cave. This information is really a gigantic rock shelf situated about a mile through rocky hills culminating in a steep climb. The walls of the cave were covered with aboriginal drawings and stencils, the most outstanding being a drawing of a snake, about 20 feet in length, executed in red ochre. The underside of the shelf is composed of a soft rock in brilliant colourings of red, russet and yellow. Nearby to the cave is a series of waterholes, at that time almost dry, but so situated as to form a system of waterfalls and cascades when rain falls. The track to the cave was along a dry creek bed, worn between banks of conglomerate rocks, where some interesting trees and plants were noted. Several acacias, particularly *A. continua, Indigofera australis,* Solanum, Eriostemon, Gossypium and *Isotoma axillaris* were in bloom.

Later in the afternoon a number of the party visited another area to inspect aboriginal petroglyphs or rock peckings. Adjacent to these are several waterholes, one of which is reputed to be a camp site of the Burke and Wills Expedition of 1860.

This area is of great botanical and historical interest, and the Barrier Field Naturalists Club is to be commended for their efforts to protect it and have a ranger appointed.

A visit to the Zinc Corporation-Rio Tinto Mine was arranged on Monday, and this proved to be one of the highlights of the trip. The party was issued with the regulation yellow "hard-hats" and escorted around the surface workings by a guide. The mine is the largest in Broken Hill and employs approximately 2,600 persons. Points of interest were the winding shed where two 2,000 h.p. motors are used to operate the cages in the three-quarter mile shaft, leading down to seven underground levels and the crushing assembly, where the ore is broken down before being placed in huge storage silos. From the crushing area it is conveyed to the flotation mill where silver, lead, zinc and other

minerals are separated ready for shipment by rail to Port Pirie in South Australia, for smelting. The Company maintains extensive parks and gardens and a citrus orchard around its workings, and it is a very pleasant spot, the surroundings not at all like those associated with a mining industry. A company geologist gave an informative talk concerning the mine operations and the mineral deposits in a small museum where a model of the lode and many mineral samples were on display.

Visits to the Flying Doctor Radio Control Base on the outskirts of the city and to Stephens Creek Reservoir were also made that same afternoon. The Reservoir was completely dry, but because of a certain amount of dampness remaining, a green carpet of grass stretched away to the brown hills. Many kangaroos, euros and emus were grazing, the area being a Wildlife Refuge, and the scene presented a contrast to that generally prevailing in this area.

That evening a very good selection of slides was shown by the Barrier Club at the Technical School while visiting members reciprocated by a showing of their own slides covering a selection of Victorian natural history and flora.

A trip to the ghost town of Silverton, 14 miles north-west of Broken Hill, was undertaken on Tuesday. Mr. Baker made his car available for a small party of birdwatchers, and in the Saltbush area, close to Silverton, red-capped robins, white-backed wrens and zebra finches were spotted. The first impression of Silverton was of a dozen or so stone buildings, squatting on a desolate, bare hill, all that remains of the labour and hopes of several thousand people now long departed, as the original mining boom declined around 1890.

On closer inspection, however, a number of people still live there, the hotel is licensed and the school is in use. The gaol, although badly defaced by vandals, has fortress-like walls and an unusual iron-barred roof over an inner courtyard.

After lunch at Penrose Park, maintained by the mining companies as a sports and picnic area, planted with lovely eucalypts and other native shrubs, the party was taken to the Umberumberka Weir. On the road to Umberumberka, a memorable view of the Mundi-Mundi Plain is seen from a hilltop. Many "willy-willies" of dust could be seen whirling across this vast expanse which stretches away to a limitless horizon. There was plenty of water in the dam and kangaroos and a number of birds, including the Eastern whiteface, White-rumped Miners, Honeyeaters and a Wedge-tail Eagle were noted in the vicinity. A Forget-me-not (*Trichodesma zeylanica*), Groundsel (*Senecio lautus*), and a purple flowering Ptilotus were found growing near the dam wall.

That evening invitations were received to visit various Barrier Club members' homes, including that of Mr. Baker. He showed some interesting slides of Broken Hill and adjacent areas, taken during a good season after heavy rains, showing a prolific growth of wildflowers and flowering trees, a remarkable comparison with the area as it was then after prolonged drought.

An excursion to Purnamoota Field was made on Wednesday, some 20 miles north of the city. This was once a very rich field, but all mines except one, have been abandoned and it now forms part of Purnamoota Station. The Lubra Mine in the Apollonian Valley was visited and members spent an enjoyable few hours fossicking. The ruins of several old buildings were of interest, as they were fine examples of the "dry wall" technique employed in

those days, using rocks found on the site, building materials being unobtainable or too expensive.

The dry bed of a creek on the Station property was chosen for the lunch stop and afterwards the party explored the locality. The River Red Gums were particularly beautiful, some having as many as 10 silvery-white trunks growing from one base. Many examples of the peculiar "horse-dropping" fungi were found as well as Lemon-scented grass, Bassia (*B. lanicarpus*), Ptilotus (*P. obovatus*), Rhagodias, Kochias and several Saltbushes not noted before.

A stop to examine and photograph an old stone hall, now used as the shearers quarters on the Station, was made on the return journey. This building, erected in 1888, is the only remaining evidence that a township of approximately 3,000 people once existed there.

Earlier in the day a visit was made to the art gallery of a local artist, "Pro" art, which proved to be of considerable interest as the collection included a number of well-known artists. Sidney Nolan, Lionel Lindsay, Brett Whitely, William Dobell, Ian Fairweather and John Brack were amongst those represented.

Miss May Harding, Art and Botany teacher at the Broken Hill Technical School entertained those interested that evening with slides and specimens of local flora, in her rooms at the school. Members took advantage of Miss Harding's prodigious knowledge of local history and botany and plied her with many questions, which she was pleased to answer, while identifying the specimens collected. Other members took advantage of Mr. G. W. Lithgow's invitation to visit his home where his extensive collection of aboriginal artifacts, minerals, books and foreign curios were of immense interest.

On Thursday an excursion to a remarkable enterprise, the Triple Chance Mine was undertaken. The mine is worked on the open cut principle and produces felspar, beryl and gemstones. As the mine is a working concern, fossicking was allowed only in the dump areas, but nevertheless, proved very rewarding. The owners are pleased to see visitors and invited the party to inspect an amazing collection of minerals and gemstones displayed in and around their home. The house was a solid concrete building, flat-roofed with walls one foot thick, and the necessity for this type of building was evident as the temperature was 90° on that day.

It was decided to have lunch at the mine before continuing, and consternation reigned for a few minutes when it was discovered that the lunches ordered by many had been inadvertently left behind. However, after donations from the more prudent members who had provided their own had been collected, all were fed.

Cockburn, a small town straddling the N.S.W.-S.A. border, was visited after lunch. The country for many miles around was very flat with occasional stony ridges sparsely dotted with mulgas, and on the plains Saltbushes (*Atriplex spongiosa, A. inflata*) the only notable vegetation. On the return journey, the party explored the Thackaringa Mine, now abandoned and surrounded by large "mullock" heaps and an odd collection of old machinery, rusting in the desert sun.

On returning to Broken Hill, a stop was made to look at the Afghan Mosque, on the perimeter of the city. Even as late as the 1930 decade, Afghan camel trains were still operating in this area, and the mosque was used by the camel drivers as their religious meeting place. A few of their descendants still live in the dis-

trict, but have evidently been integrated with the Australian population and the mosque has been taken over and is being made into a museum by the Historical Society.

That evening a number of the party visited the Charles Rasp Memorial Library, where the Director allowed a wonderful collection of historical records and old newspapers to be inspected. The Library has been so named to honour Charles Rasp, a boundary rider, employed on Mt. Gipps Station, who, in 1883, discovered the lode and pegged the first mining claim in Broken Hill.

On Friday, the return journey to Melbourne was commenced, when we left Broken Hill and drove eastwards along a smooth bitumen highway to Menindee on the Darling River.

It is worth noting that when entering or leaving Broken Hill, an area of vegetation is seen which completely encircles the city. This is the Regeneration Area, initiated in 1937, by the late Mr. Albert Morris, a metallurgist employed by the mines, who was also a keen botanist. The area has been fenced to prevent grazing and the natural trees and undergrowth, supplemented with drought-resistant species from other areas, (noted were Tamarisk and Bell-fruit (*Codonocarpus cotinifolus*), has now transformed sandy wastes into a parkland. This barrier has helped considerably to prevent erosion and minimize dust storms.

Along the 70 miles to Menindee, the road passes through undulating country with Mitchell grass, acacias and mulga predominating, gradually giving way to flat plains broken by stands of Black Box (*Eucalyptus largiflorens*) and Belar (*Casuarina cristata*) outlining the creek banks. A sand-binding grass (*Zygochloa paradoxa*) resembling spinifex, growing in thick, wiry cushions, was seen as Menindee was neared. After passing through the small settlement of Quandong, a long ridge of sandhills ran southwards and it is in this area that the Kinchega National Park has recently been declared as a fauna sanctuary.

The Menindee Lakes Storage Scheme is the result of diverting the waters of the Darling, by a system of weirs, block dams and regulators into what was originally a series of broad, shallow basins to form a number of lakes. Lake Menindee is the largest, covering an area of 40,000 acres with Lake Wetherell, Lake Cawndilla and Lake Pamamaroo the more important of the smaller lakes in this 30 miles long chain. Broken Hill receives an unfailing water supply from this scheme, the water being pumped the 70 miles through a large pipeline, which can be seen following the road most of the way. The lakes provide an excellent beach resort for the people of Broken Hill, and all types of water sports are popular, even yachting.

There is prolific birdlife and swans, ducks, pelicans, Yellow-faced Cormorants, Terns and Gulls were seen feeding on the lakes. Perched in the branches of dead trees, drowned by the rising waters, were White Egrets and Blue Herons, and a number of nests were also observed.

After lunch, which was eaten under a large Eucalyptus tree, known as Sturt's Tree, believed to have been a camp site of that expedition, we said farewell to those members of the Barrier Club who had accompanied us to Menindee, and had been our guides around this most interesting development.

Turning off the main highway after leaving Menindee, the road, for the most part a dusty track, ran due south, following the eastern bank of the Darling River. The river was muddy

and sluggish, flowing slowly through a tunnel of River Red Gums. There is little habitation, with only stunted scrub, mostly Bullock bush (*Heterodendron oleifolium*), Belar (*Casuarina cristata*), Pines (*Callitris huegelii*) and Acacias (*A. ligulata, A. burkittii*), to be seen for many miles. The latter were blooming magnificentlly, a welcome sight in country suffering severely from drought.

About midway, Pooncarie was reached, a small, unremarkable township, with no visible means of support but with a hotel which served cold beer, eagerly patronized after the dusty miles. Between Pooncarie and the Victorian border, many kangaroos, emus and parrots, notably yellow rosellas, were observed feeding along the roadside. Rain had fallen the previous week and a light carpet of grass covered the sandy terrain, attracting the animals and birds, the most we had seen during the trip. To this date, the number of animals observed was pitifully small, due to the inroads of professional shooters and dry conditions.

Mildura was reached at 6.30 p.m. and after settling into the motel and having dinner at a local restaurant, members were guests of the Sunraysia Naturalists Club for a showing of slides. This was held at the Chaffey Museum, a gracious, old, two-storeyed, red-brick house, set in lawns and gardens, facing the Murray River, formerly the home of the Chaffey Brothers, Mildura's founders. Restoration of the home, including furnishings, oil lamps, and other items of the period is almost complete, and it is well worth a visit.

Before departing from Mildura on Saturday morning, a short visit was made to the Working Men's Club, set in well tended gardens and claiming to have the longest bar in Australia. Led by our intrepid bus driver, Mr. Bill Bell, the large party filed through the club, but as it was before opening time, it was a case of looking and not tasting.

It was then on to Hattah Lakes for a 2 hour lunch stop, after passing through the citrus growing areas of Irymple and Red Cliffs. The introduced shrub "boneseed" (*Chrysanthemoides monilifera*) appeared to have become widespread in this district as large clumps were flowering in many places. After lunch beside one of the lakes in the Hattah series, members formed into small parties to explore the vicinity. Some of the more energetic managed to walk around the lake, which was partly dried out but still supported many acquatic birds. Also a large flock of egrets were observed, ringneck parrots were numerous, and two keen birdwatchers were fortunate to see a Blue-faced Honeyeater. There was a dearth of flowering plants near the lake as the area had been cleared for camping, but there were found lovely specimens of *Swainsona swainsonioides*, Helipterum (*H. albicans*), and a low growing compact bush, covered with bright yellow flowers, which was probably a senecio.

Swan Hill was reached by mid-afternoon where a flat tyre caused an unscheduled stop in the main street. Most of the party took the opportunity to walk through the attractive park to the Folk Museum, where several enjoyable hours were spent. This unique reserve, which honours the district pioneers, is entered through the paddle steamer "Gem", moored in a small canal off the Murray River. The park covers several acres and has been planted with indigenous trees and shrubs, the purple hovea (*H. heterophylla*) was a splash of colour at that time. Old bush homesteads, a bank, school, shops, farm implements,

steam engines, log jinkers, etc., have been transported from their original sites and re-erected to create a pioneer village.

A comfortable night was spent at the Planet Motel and the next day saw the end of our trip in sight: to Melbourne via Bendigo. This was an uneventful journey, although it was varied by passing through Sedgwick after leaving Bendigo, before rejoining the Calder Highway at Harcourt. The lush, green fields and blossoming fruit trees of the district was a strong contrast after the desert scenery of the previous week.

The excursion was voted a tremendous success by all and special thanks must be given the Barrier Field Naturalists Club members whose hospitality and guidance were much appreciated. The journey covered 1614 miles and thanks also must be extended to our bus driver, Mr. Bill Bell, who, despite having to negotiate many dusty and bumpy miles off the beaten track, always remained cheerful and obliging.

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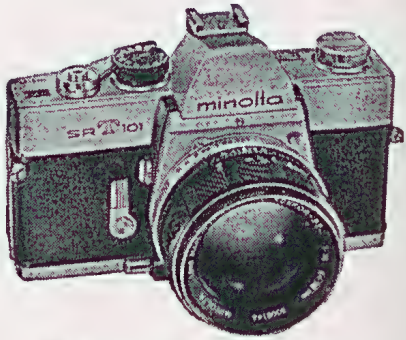

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The Preston Junior Field Naturalist Club

The Preston Junior Field Naturalist Club is now in its fourth year, and membership has grown steadily, nurtured under the capable leadership of Mrs. Zilla Lee. Her wide experience and guidance is appreciated by all members.

Office Bearers—1st March 1968

President—Mrs. Z. Lee.

Vice-Presidents—Mrs. Robertson, Mr. Howard Geary.

Hon. Secretary—Mrs. E. Jenner, 9 Foch Street, Reservoir 3073.

Hon. Treasurer—John Briggs.

Publicity Officer—Mr. Peter Kelly.

Committee Members—Mrs. Fox, Clive Fox, Susan Robertson, Robyn Jenner, Russell Binion.

Mr. Ken Trotter is the group leader for our microscope studies, and always provides an interesting range of specimens and work for our members.

Geology specimens are the speciality of Howard Geary, who exhibited a collection of geology specimens in the September Nature Show of 1967.

Junior members keep up a wide range of exhibits and at each meeting one of our National Parks is discussed.

Guest Speakers

The club is especially grateful to the many fine speakers who have highlighted our meetings with their knowledgeable lectures and projected slides. Speakers for the last two meetings have been Mr. Roy Wheeler, who spoke on "Birds of Yellingbo", and Mr. Bruce Fuhrer, whose subject was "Fungi".

An excursion in March of this year was enjoyed by 26 club members who journeyed by bus and private cars to the You-Yang Forest Reserve, and proceeded to the Serendip Wildlife Research Centre.

Books on loan from the F.N.C.V. Library are always well patronized and sought after by our junior members.

E. Jenner
Hon. Sec.

Mammal Survey Group

Mammals of the Metropolitan Area

In addition to the surveys being undertaken further afield, the Mammal Survey Group is commencing a survey of the mammals of the Metropolitan area. This will be based largely on locality records for mammals in the Melbourne suburbs, with attention being directed initially at the two possums common in Melbourne, the ringtail *Pseudocheirus lanuginosus* and the brushtail *Trichosurus vulpecula.*

The group therefore requests all F.N.C.V. members to help. Reports of sighting of either of these possums (or any other non-domestic mammal) would be greatly appreciated in expanding our records. All data will be plotted on a map of the Melbourne area. Specific details of localities are needed, so that they can be pin-pointed in a street directory, with details of date, time of day and surroundings.

Information should be sent to the Hon. Secretary, Mammal Survey Group, 39 Huntingtower Road, Armadale 3143.

The Field Naturalists Club of Victoria

General Meeting—13 May

Approximately 100 members were present, with Mr. F. Jeffs taking the Chair in the absence of Mr. E. Allan who tendered his apology to the guest speaker, Mr. Whitley. An apology was also received from the National Parks Authority for having no representative present.

The minutes of the April meeting, having been approved by Council, were taken as read on a motion from Mr. Woolard.

The Secretary gave a report regarding the quarrying operations taking place in the Lerderderg Gorge, and suggested that serious damage could occur if these became permanent works. He suggested a great amount of pressure must have been brought to bear by the quarry proprietors.

Correspondence was received and read from the Illewarra Natural History Society regarding the Wood-chip Industry.

The Excursion Secretary reported a change of venue for Sunday, 19 May, as Mr. Willis was unable to attend on that date. Mr. McInnes offered to lead an excursion instead to Lerderderg Gorge. The June excursion will now be led by Mr. J. Willis.

Mr. McInnes gave details of his excursion and endorsed the remarks of the Secretary regarding quarrying at the Gorge.

The Natural History Medallion presentation speech was then made by Mr. A. Dunbavin Butcher, who gave some indication of the excellent qualifications of the 1967 recipient and guest speaker, Mr. Gilbert P. Whitley. He was for many years the Curator of Fish and Historian of the Australian National Museum until his retirement in 1964. He collected molluscs and fish from every state in Australia, and also from Lord Howe Island. In 1928 he was a member of the British Great Barrier Reef Expedition. When repellents were being tested on sharks, he was the first person to tag these fish. In 1958 he attended a symposium in New Orleans, U.S.A., on the shark menace; and in 1968 at Mandapan in Sth. India, attended a Conference on mackerel.

The silver Galatia medal was awarded to him by the King of Denmark, for his association with Danish Oceanography in 1956.

Mr. Whitley replied with a speech of thanks for the honor bestowed upon him, and the Acting President thanked Mr. Butcher for his presentation speech.

F.N.C.V. Publications Available for Purchase

FERNS OF VICTORIA AND TASMANIA, by N. A. Wakefield.

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VICTORIAN TOADSTOOLS AND MUSHROOMS, by J. H. Willis.

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THE VEGETATION OF WYPERFELD NATIONAL PARK, by J. R. Garnet.

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Address orders and inquiries to Sales Officer, F.N.C.V., National Herbarium, South Yarra, Victoria.

Payments should include postage (9c on single copy).

Under the title of "A Naturalist's Life", Mr. Whitley with the greatest of humour started us off with a slide of his grandparents a 100 years ago and quickly followed up with slides of himself as a child, and a childhood drawing of a cat which proved his desire to be a Naturalist. By the time the laughter had died down we were being introduced to the staff at the National Museum at Sydney in 1922, where he was to become assistant to Allan McCulloch, the well-known Naturalist.

Here was McCulloch himself in his element, strapped to a camera on a cliff top path at Lord Howe Island, taking pictures of the sea. Also apparently at this time some of the first pictures of marine biology were attempted under water.

We even saw a letter from Charles Darwin thanking the unknown Australian for the material he had been sent. It was interesting to see the early pictures of specimens being collected by boat, with a spearman poised to spear a ray about which very little was known at that time.

During a trip across South India Mr. Whitley lived with the people in their huts. The coastal vegetation was vastly different from our own. Of particular interest were slides taken of a trip to South East Asia. It really is difficult to detect elephants against a jungle background. The slide we were looking at was not scrub interlaced with rocks, but elephants interlaced with scrub.

He showed a slide of a Japanese fish-market, with acres of Tuna at four o'clock in the morning, and everything vanished by seven that same morning.

It is difficult to think of so many slides being taken over a lifetime, and one in particular which would be very rare was of a Thylacine in the Hobart Zoo in the 1920's.

The Acting President thanked the guest speaker, and Mr. J. Baines moved that a vote of thanks be given to Mr. Whiteley.

The new members whose names appeared in the *Vict. Nat.* were duly elected on a motion from Mr. Fairhall.

Under General Business, Mr. Taylor spoke about the granting of mining licences for rutile extraction, and moved that the Secretary write to the Minister concerned with issuing of licences, and extractive industries, to ensure that areas above high tide were not completely denuded of vegetation. Misses Galbraith and Woolard, and Messrs. Baines and Garnet each spoke on the matter.

Mr. McInnes requested that members provide small shrubs and bush material for the Lyre-bird display at the forthcoming Nature Show. It was suggested that this material be taken from land which is being cleared so as not to disturb the natural bushland.

In Nature Notes, Mr. McInnes mentioned the lack of marine life at Altona, which may be caused through excessive discharge of industrial wastes into the bay.

Mr. Ros Garnet told of some boys who were watching him gardening, and while doing so they named all the native shrubs. On talking to them he found that they were members of the Pascoe Vale F.N.C., and he suggested to the meeting that we give them encouragement. Mr. Lewis mentioned that the Mammal Survey Group was lacking in reports of mammals from this area, and would welcome any. The meeting then closed.

EXHIBITS

Mr. D. McInnes—Inclusions in basalt from Lake Merrimu Project; slime fungus shown under Club microscope.

Mr. A. J. Swaby—A Pratia or Lobelia plant for identification from Sherbrooke Forest; a specimen of *Acrotriche fasciculielora* from Lofty Range and Kangaroo Island.

R. McGavin—106 species of fungus from St. Andrews Nth.

Botany Group Meeting—9th May

The meeting was attended by sixteen members, and Mr. B. Fuhrer took the Chair. He also addressed the meeting on "The Spore Dispersal of Fungi".

His talk concentrated on the *Basidiomycetes* class of fungi. The spores in this class are borne on *Basidia*, which are club-shaped growths. These are supported by *Paraphyses* (sterile Hyphae). The Basidium and Paraphyses are situated on the gills of fungi. In the common gilled fungi the fruiting body always grows upright, thus enabling spores to fall freely through the gills towards the ground. In some fungi, spores are shot through small holes at one end of the spore sac. The energy for this action is derived from an osmotic pressure within the spore sac. The use of a recoiling spring device for spore dispersal is often found.

The foetid odours of fungi attract flies,

which then carry away the spores to give yet another way of dispersal. Other spores have to pass through digestive tracts of insects or animals.

The transportation by raindrops and slight wind movements are all part of nature's way of ensuring adequate dispersal of spores. Mr. Fuhrer's drawings on the blackboard gave a clear description of this interesting subject.

Afterwards, Mr. Fuhrer showed colour proofs of the forthcoming book "Flowers and Plants of Victoria in Colour"—the subject of the June General Meeting. The Botany Group has a special interest in this book, the joint authors of which are Mr. J. H. Willis and Mr. G. Ross Cochrane, with Mr. B. Fuhrer and Mr. E. Rotherham joint photographic editors.

Microscopy Group Meeting—20th March

Mr. J. Dawes chaired the meeting, and the 13 members present were favoured with a talk by Mr. Paul Genery on his research into the existence of the *Graspedacusta-sowerbyi lankester*, its habitats, and life cycle, particularly in the Yarra River upstream.

Briefly referring to the early history of discovery in 1880 of this fresh water jelly fish, he then outlined the subdivisions and described their biology. One of several specimens recently obtained from the Yarra River was shown under the microscope, and also through the microprojector. A clear illustration of its form and movement was thus gained.

The importance of water temperature and light intensity was emphasized as a factor in the life of the medusa.

Exhibits, shown under microscopes, were as follows:

MR. C. NANCE—Transverse sections of leaves from *Euc. Cosmophylla, Euc. Incrassata* (Yellow Mallee), *Euc. Globulus* (Blue Gum), *Euc. Sideroxylon* (Red Ironbark), *Euc. Tetragona, Euc. Citriodora* (Lemon Scented Gum), *Euc. Botryoides* (Mahogany Gum).

CARL MEYER—Botanical Sections. Section of fluted stem—Yew tree.

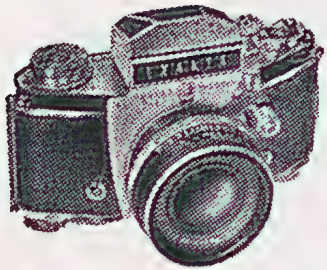
MR. P. GENERY—Medusa: Living creature, stained specimen—nematocysts, and slide using graded alcohols.

MR. W. GENERY—Round worm—*Astaris.*

JAMES MILOJKOUIC—Diatoms.

MR. K. TROTTER—Pathological slides of human tissues.

Next meeting of the Microscopy Group 19 June 1968.



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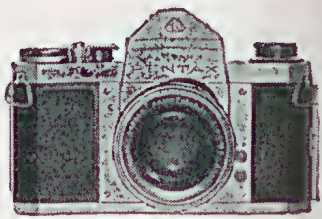

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F.N.C.V. DIARY OF COMING EVENTS

GENERAL MEETINGS

Wednesday, 12 June—General Meeting at National Herbarium, The Domain, South Yarra, commencing at 8 p.m.

1. Minutes, Reports, Announcements.
2. Correspondence.
3. Subject of evening—"Victorian Plants and Flowers in Colour". Messrs. Willis, Fuhrer and Rotherham.
4. New Members—
   (a) *Ordinary:*
   Mrs. L. Stuart-Smith, 20 Stornoway Road, Burwood 3125. (Interests—Mammal Survey and Botany.)
   (b) *Joint:*
   Mr. and Mrs. M. C. O'Hagan, 1A Charles Street, Burwood 3125. (Interests—Geology and Botany.)
5. General Business.
6. Nature Notes and Exhibits.

GROUP MEETINGS

(8 p.m. at the National Herbarium unless otherwise stated)

Wednesday, 19 June—Microscopical Group.

Friday, 28 June—Junior Meeting at 8 p.m. at Hawthorn Town Hall.

Monday, 1 July—Entomology and Marine Biology Group. This group meets in Mr. Strong's rooms in Parliament House at 8 p.m. Enter through private entrance at south end of house.

Wednesday, 3 July—Geology Group.

Thursday, 4 July—Mammal Survey Group; meets in Fisheries and Wildlife Dept. Rooms at 7.45 p.m.

Friday, 5 July—Junior Meeting at Rechabite Hall, 251 High Street, Preston, at 8 p.m.

Thursday, 11 July—Botany Group.

FUTURE MEETINGS

Monday, 8 July—J. Ros. Garnet—Queensland.
Monday, 12 August—R. Wheeler—Birds.
Monday, 9 September—J. Willis—New Zealand for the Naturalist.

F.N.C.V. EXCURSIONS

Sunday, 16 June—Dandenong Ranges. Subject: Fungi. Leader, Mr. J. H. Willis. The coach will leave Batman Avenue at 9.30 a.m. Fare $1.40. Bring one meal and a snack.

31 August-8 September—Grampians. The coach will leave Melbourne on Saturday, 31 August, and remain with party for day trips. Accommodation has been booked at Grampians House for those in coach. The excursion will cost $60.00 and a deposit of $10.00 should be paid when booking and the balance by the end of July, all cheques being made out to "Excursion Trust".

Field Naturalists Club of Victoria

Established 1880

OBJECTS: To stimulate interest in natural history and to preserve and protect Australian fauna and flora.

Patron: His Excellency Major-General Sir Rohan Delacombe, K.B.E., C.B., D.S.O.

Key Office-Bearers, 1968/69

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Mr. E. R. Allan

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Immediate Past President: Mr. W. L. Williams

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Hon. Treasurer: Mr. D. E. McInnes, 129 Waverley Road, East Malvern, 3145 (211 2427)

Hon. Editor: Mr. G. M. Ward, 54 St. James Road, Heidelberg, 3084.

Hon. Librarian: Mr. P. Kelly, c/o National Herbarium, The Domain, South Yarra, 3141.

Hon. Excursion Secretary: Miss M. Allender, 19 Hawthorn Avenue, Caulfield 3161.

Subscription Secretary: Mrs. N. E. Lewis, 1 Billing Street, Springvale 3171. (546 4649).)

Group Secretaries:

Botany: Mr. K. Kleinecke, 8 Oliver Street, Ashburton 3147 (25 2415).

Geology: Mr. T. Sault, 9 The Avenue, West Rosebud.

Microscopical: Mr. M. H. Meyer, 36 Milroy Street, East Brighton (96 3268).

Mammal Survey: Mrs. R. Frankenberg, 39 Huntingtower Road, Armadale 3143.

Entomology and Marine Biology: Mr. J. W. H. Strong, Legislative Council, Parliament House. Melbourne, 3002.

MEMBERSHIP

Membership of the F.N.C.V. is open to any person interested in natural history. The *Victorian Naturalist* is distributed free to all members, the club's reference and lending library is available, and other activities are indicated in reports set out in the several preceding pages of this magazine.

New Rates of Subscriptions for 1968

Ordinary Members	$7.00
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All subscriptions should be made payable to the Field Naturalists Club of Victoria, and posted to the Subscription Secretary.

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the VICTORIAN NATURALIST

Vol. 85, No. 7 JULY, 1968

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Pictured above are two Western Australian Eucalypts which are in flower at present in Melbourne.

Above—*Eucalyptus torquata*

Below—*Eucalyptus caesia*

The Victorian Naturalist

Editor: G. M. Ward
Assistant Editor: P. Gahan

Vol. 85, No. 7 4 July, 1968

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Front Cover:

At Kiata near Nhill, in Western Victoria, there is a Sanctuary which is primarily set aside for the protection of the Lowan. In October last, the editor, guided by Mr. Keith Hately the Ranger, saw many mounds of the Lowans, and photographed the one shown. It is of special interest, for it has been in use since 1895, and was the mound at which A. J. Campbell did much of his study of these birds. It is estimated that about 20 tons of material is heaped into this mound which is 18 feet in diameter.

The Mammal Fauna of Darlimurla

by J. H. SEEBECK*†, JUDITH FRANKENBERG* and J. W. F. HAMPTON*

SUMMARY

A survey of a small area of secondary regrowth forest in South Gippsland, Victoria, carried out between June 1966 and June 1967, has shown the presence of seventeen indigenous and three introduced species of mammals.

Introduction

The survey dealt with in this report was undertaken by members of the Mammal Survey Group of the Field Naturalists Club of Victoria, the function of which is to study the distribution of native mammals within the State. Participants in the survey are listed in the authors' Acknowledgements.

The attention of this Group was drawn to an area of forest in South Gippsland which local naturalists considered should be preserved in its natural state. At the request of the Darlimurla Flora and Fauna Preservation Society, a systematic study was undertaken during a period of thirteen months to examine the mammal population and assess the value of the area as a faunal reserve.

Description of Area

The study area was a block of secondary regrowth forest of about 245 acres, of irregular shape, and bounded on its five sides by roads (see Figure 1). It lies immediately south of the Darlimurla township, and is centered about 420200E and 268300N of the ordnance grid (38°23′00″ S, 146°12′40″ E) at an altitude of about 600 feet above sea level, just north of the divide between the Morwell and Tarwin River catchments. It is more or less bisected by a permanent creek running approximately north-east, so that the area consists in general of slopes having south-east and north-west aspects. The area is bounded on two sides by newly planted *Pinus radiata*, and on another side the natural forest is being extensively thinned out by timber-getters. It is considered to be typical of similar areas of forest which are isolated by, and interspersed with cleared agricultural land on the northern slopes of the South Gippsland Highlands. Some relevant meteorological data are presented in Table I.

Geology and Soils

The South Gippsland Highlands consist of Jurassic sedimentary rocks, overlain in sequence by Tertiary sub-basaltic gravels and conglomerates, older basalt and post-basaltic sands and gravels. In the study area post-basaltic sands and gravels lie on the surface and have produced an acidic duplex soil, which is subject to extensive leaching of minerals and organic material. In places, quite large deposits of white gravel or coarse sand are visible. The soil is described in the Australian Atlas of Soils (1961) as a Hard Acidic Yellow Mottled Duplex

† Fisheries and Wildlife Department, 605 Flinders Street Extension, Melbourne, Vic. 3000.

* Mammal Survey Group, F.N.C.V. C/o Hon. Sec., 40 Howard Street, Reservoir, Vic. 3073.

Soil with bleached A2 horizon, and is coded as Dy 3.41.

Deposits of bauxite are known to occur in the vicinity, and near the township of Darlimurla substantial seams of brown coal have been located.

Vegetation of the area

The vegetation of the survey block is characteristic of the northern slopes of the South Gippsland hills. The predominant vegetation is an open forest ranging from 30 feet to about 60 feet high, of Narrow-leaved Peppermint (*Eucalyptus radiata*), Brown Stringybark (*E. baxteri*), and Yertchuk (*E. consideniana*). These species are found over the whole area, except in the gully, where Mountain Grey Gum (*E. cypellocarpa*), Messmate (*E. obliqua*), and probably Manna Gum (*E. viminalis*) are dominant. On the ridge tops, Peppermint often occurs alone, and may be only 25 feet high. Messmate is common on the lower slopes of the ridges as well as in the gully, and Silvertop (*E. sieberi*) is found on the south-east aspects, particularly in the south-west part of the block, between the Old Darlimurla Road and Sargent's Road. Silver Stringybark (*E. cephalocarpa*) occurs on the margins of a small swamp in the south-east corner, and Swamp Gum (*E. ovata*) at the head of the gully on Sargent's Road.

The understory ranges from dense small trees such as Blackwood (*Acacia melanoxylon*), Silver Wattle (*A. dealbata*) and Treeferns in the gully, to sparse low heathy shrubs with scattered Silky Hakea (*Hakea sericea*) up to 10 feet tall on the ridge tops in the south-east corner. On the lower slopes of the ridges the undergrowth is often very sparse, with scattered Hook Sallow Acacia (*A. mucronata*) and Prickly Moses (*A. verticillata*), tangles of Wiry Bauera (*Bauera rubioides*), Wiregrass (*Tetrarrhena juncea*), and Bracken (*Pteridium esculentum*) in gaps. Over most of the block, the undergrowth is shrubby, with Kanuka (*Leptospermum juniperinum*) and Burgan (*L. ericoides*) the dominant species.

In small side gullies and in a swampy basin in the south-east corner Scented Paperbark (*Melaleuca squarrosa*) with *Bauera rubioides* and Pouched Coral Fern (*Gleichenia circinnata*) form dense thickets.

TABLE I

Month	Temperature (°F)[1]		Rainfall[2] (ins.)	Rain days[2]
	Maximum	Minimum		
January	76·4	52·9	2·05	6
February	77·1	54·2	2·37	8
March	73·9	52·2	2·93	8
April	66·4	48·4	3·70	11
May	61·5	45·0	3·81	15
June	56·4	41·7	4·28	14
July	55·4	40·8	3·56	15
August	57·5	41·7	3·93	15
September	61·3	43·7	3·99	13
October	65·1	46·1	3·74	13
November	69·4	48·4	3·32	11
December	73·7	51·1	3·05	9
Total			40·73	138

1. Temperatures are 28 year average recorded at Leongatha.
2. Precipitation data is a 40 year average to 1961 for Mirboo North.

Methods

Trapping, spotlighting, and the collection of skeletal material were the main methods used in determining which species were resident in the area. Trapping of terrestrial mammals was carried out using wire mesh cage traps, 14″ x 8″ x 7″, baited with a mixture of peanut butter, rolled oats, and honey. On two visits, mist nets and a Constantine trap were used to trap bats. Night observation of both terrestrial and arboreal species was by means of portable spotlights, usually between dusk and midnight.

Results

Tables II and III show details of the survey effort, and trapping and spotlighting success, which are illustrated in Figure 1.

TABLE II

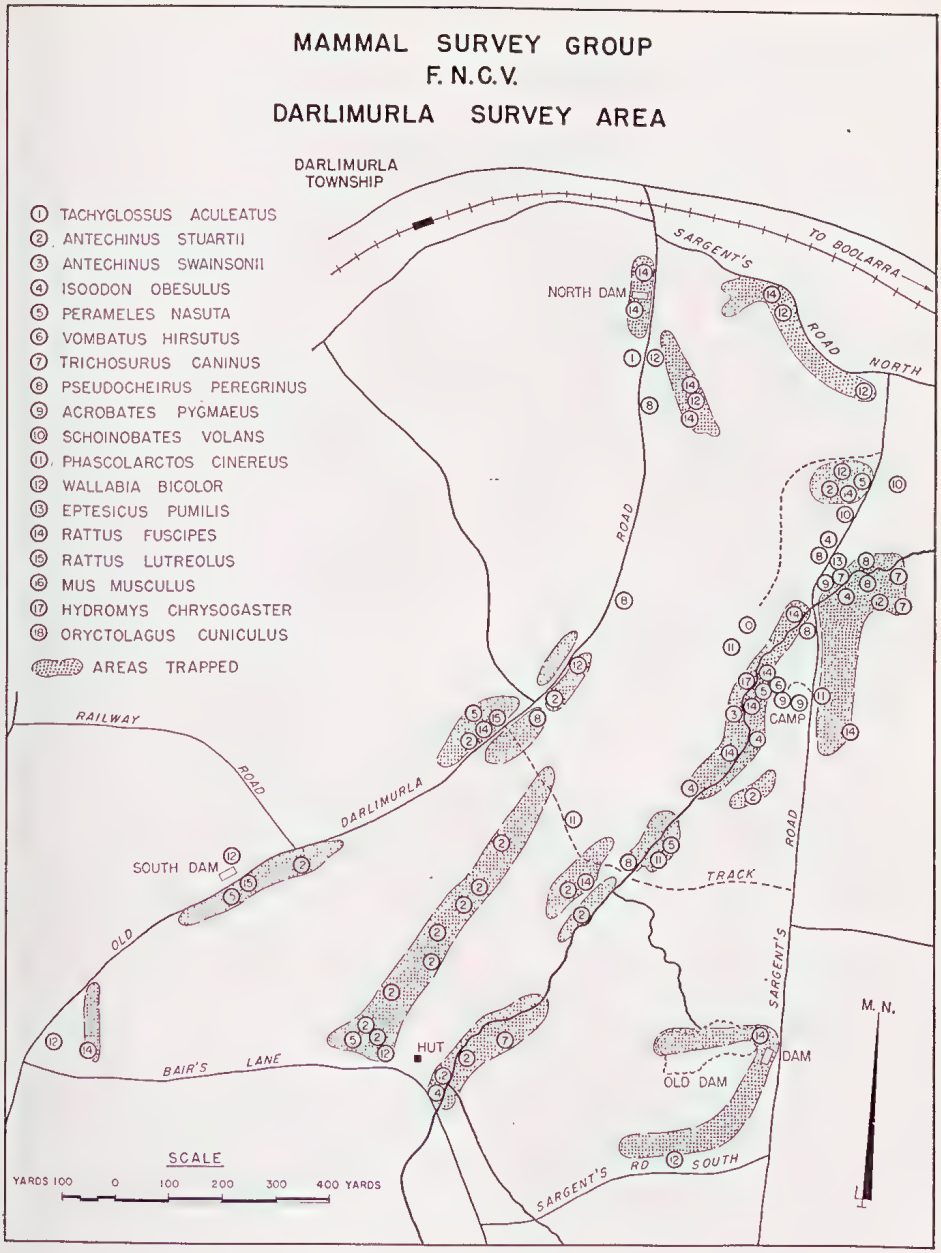
Results of Survey Effort

Date	Trap-nights	Specimens trapped (all species)	Spotlight hours	Specimens seen (all species)
Jun. 1966	51	3	12	3
Aug. 1966	60	7	11	5
Oct. 1966	38	0	6	4
Nov. 1966	107	7	19	11
Feb. 1967	55	8	18	4
Mar. 1967	160	13	21	13
Jun. 1967	143	18	44	19
Totals	614	56	131	59

TABLE III

Apparent abundance of species (numbers seen or caught)

Species	Jun.	Aug.	Oct.	Nov.	Feb.	Mar.	Jun.	Total
Tachyglossus aculeatus				1				1
Antechinus stuartii	1	3		1		2	16	23
Antechinus swainsonii					1			1
Isoodon obesulus			1					1
Perameles nasuta				1		1	2	4
Vombatus hirsutus				1				1
Trichosurus caninus		1			2	2		5
Pseudocheirus peregrinus		3	2	3		1	4	13
Acrobates pygmaeus	2				1			3
Schoinobates volans				1		2	1	4
Phascolarctos cinereus	1						1	2
Wallabia bicolor		1	1	6	2	8	1	19
Eptesicus pumilis					1			1
Rattus fuscipes	2	4		5	5	5	1	22
Rattus lutreolus				1		4		5
Mus musculus							1	1
Hydromys chrysogaster						1		1
Oryctolagus cuniculus							6	6


MAMMAL SURVEY GROUP
F. N. C. V.
DARLIMURLA SURVEY AREA
DARLIMURLA TOWNSHIP
① TACHYGLOSSUS ACULEATUS
② ANTECHINUS STUARTII
③ ANTECHINUS SWAINSONII
④ ISOODON OBESULUS
⑤ PERAMELES NASUTA
⑥ VOMBATUS HIRSUTUS
⑦ TRICHOSURUS CANINUS
⑧ PSEUDOCHEIRUS PEREGRINUS
⑨ ACROBATES PYGMAEUS
⑩ SCHOINOBATES VOLANS
⑪ PHASCOLARCTOS CINEREUS
⑫ WALLABIA BICOLOR
⑬ EPTESICUS PUMILIS
⑭ RATTUS FUSCIPES
⑮ RATTUS LUTREOLUS
⑯ MUS MUSCULUS
⑰ HYDROMYS CHRYSOGASTER
⑱ ORYCTOLAGUS CUNICULUS
AREAS TRAPPED
SARGENT'S
TO BOOLARRA
NORTH DAM
ROAD NORTH
ROAD
CAMP
RAILWAY
ROAD
DARLIMURLA
SOUTH DAM
OLD
TRACK
ROAD
SARGENT'S
HUT
BAIR'S LANE
OLD DAM
DAM
SARGENT'S RD SOUTH
M. N.
SCALE
YARDS 100 0 100 200 300 400 YARDS

Systematic Account of Mammals

A list of the mammal species collected or seen in the area is given in Table IV. Sixteen indigenous species and two introduced species were observed, and evidence was found for the presence of two other species (one indigenous, one introduced), although no specimens of these were encountered. Specimens retained are designated by their registration numbers in the collection of the Fisheries and Wildlife Department of Victoria.

Order Monotremata

1. Echidna, *Tachyglossus aculeatus* (Shaw).

Although there were numerous signs of echidna activity, particularly in the drier areas in the south-east and north-west corners of the area, only one specimen was seen. This was observed digging beside a burnt-out tree stump during the early afternoon.

Order Marsupiala

Family Dasyuridae

2. Brown Phascogale, *Antechinus stuartii* (MacLeay).

This species is apparently the most abundant marsupial in the locality, as twenty-three specimens were collected—about 30% of all marsupials encountered. Most specimens were collected in June 1967 in an area dominated by tall, widely spaced *Eucalyptus obliqua,* with a dense ground cover of *Pteridium esculentum, Tetrarrhena juncea, Lepidosperma* sp., *Pultenea scabra, Bauera rubioides* and *Epacris impressa* under *Acacia verticillata,* but other specimens were obtained along the creek, one being trapped on a sand bar jutting out into the water.

Specimens: Skins and skulls: D.632 ♂, 26.vi.1966; D.644 ♂, 6.viii.1966; D.645 ♀, 7.viii.1966; skull only: D.651 ♀, 13.xi.1966; in spirit: D.692 ♂, 12.vi.1967.

3. Swainson's Phascogale, *Antechinus swainsonii* (Waterhouse).

One specimen only was taken. It was trapped at the entrance to a burrow beside a log on the creek bank, 18 ins. from the water's edge amongst *Blechnum nudum* and *Lepidosperma* sp. In view of the large trapping effort along the creek in similar habitat it appears that *A. swainsonii* is not common in the area.

Specimen: Skin and skull: D.661 ♀, 19.ii.1967.

Family Peramelidae

Two species were seen in the area. The third Victorian species, *Perameles gunnii,* does not now occur east of Latitude 144°E.

4. Short-nosed Bandicoot, *Isoodon obesulus* (Shaw and Nodder).

Only one individual was sighted by spotlight, in October, 1966. However, in view of the great amount of bandicoot activity seen, and the very few specimens obtained of either species, it is probable that this single observation did not represent the true relative density of the species. The specimen was identified on the basis of general form, colour and short, rounded ears, by A. E. Howard, who has observed and handled the species in other areas of Victoria.

5. Long-nosed Bandicoot, *Perameles nasuta* (Geoffroy).

Apparently more common than *Isoodon,* but only four specimens were encountered. Two specimens were trapped and two sighted by spotlight by J. H. Seebeck. One trapped specimen was examined, photographed and released at the site of capture. All were in areas of fairly open *Eucalyptus obliqua* with dense undergrowth of *Pteridium esculentum* and *Tetrarrhena juncea.*

Specimen: Skin and skull: B.120 ♀, 26.iii.1967.

Family Vombatidae

6. Wombat, *Vombatus hirsutus* (Perry).

Judging from the number of used burrows and fresh scats seen, wombats were fairly common, but the species was sighted only once. This animal was seen crossing Sargent's Road North at about midnight on November 13th, 1966.

Family Phalangeridae

Five species of phalangerid were found in the area. It is almost certain that the Sugar Glider, *Petaurus breviceps*, also occurred there, but none were located. Several trees were seen that appeared to have been worked by this species and on at least two occasions individuals were heard calling but could not be located. A nest containing three Sugar Gliders was found in a fallen Mountain Grey Gum (*Eucalyptus cypellocarpa*) after a severe storm in December, 1966, about half a mile north of the survey area. The Eastern Pygmy Possum, *Cercartetus nanus*, probably also occurred in the area, but no evidence of its presence was found. It has, however, been recorded from similar areas elsewhere in South Gippsland.

7. Bobuck, *Trichosurus caninus* (Ogilby).

Apparently not uncommon but seemed to be restricted to the area around the creek. Usually the animals were first heard calling and then were located by spotlight. Most were observed in Silver Wattle (*Acacia dealbata*).

8. Ringtail, *Pseudocheirus peregrinus* (Boddaert).

This species was the most common possum seen. Specimens were observed both along the creek in Messmate (*Eucalyptus obliqua*) and Silver Wattle (*Acacia dealbata*) and in Yertchuk (*Eucalyptus consideniana*) along the Old Darlimurla Road, the highest and driest region of the area. Ringtails were observed on most visits and were seen in about equal numbers in all seasons. No nests were located in the area.

9. Feathertail, *Acrobates pygmaeus* (Shaw).

Three specimens only were seen, but this species was probably much more common than results indicate. Sightings are generally fortuitous due to the very small size of the animals. Two individuals were seen on the first night of the survey, one on the trunk of an old Messmate (*Eucalyptus obliqua*), the other in the branches of a young Narrow-leaved Peppermint (*Eucalyptus radiata*). Both were approximately 20 feet from the ground when first sighted. The third specimen was captured when it ran along the top suspending rope of a mist net.

Specimen: Skin and skull: P.630 ♂, 25.vi.1966.

10. Greater Glider, *Schoinobates volans* (Kerr).

Not common in the area. Four specimens were seen, all feeding high up in the trees. On two occasions the food tree was identified as Mountain Grey Gum, *Eucalyptus cypellocarpa*. Animals were seen feeding between 7.40 p.m. and midnight.

11. Koala, *Phascolarctos cinereus* (Goldfuss).

Koalas were seen only twice, on both occasions in mid-winter, in *Eucalyptus cypellocarpa* and *Eucalyptus obliqua*. Fresh scats were found just east of the survey block and an animal was heard calling in the north-west corner. Two old skulls were found near the creek. It is interesting to note that some older local residents report

that koalas were extremely common around Darlimurla prior to the severe bush-fires in 1898 which destroyed most of the forest in the area. (In litt., The Weekly Times, 12 April, 1967).

Specimens: Pick-up skulls: K.175 unsexed, 11.vi.1967; K.176 unsexed, 25.iii.1967.

Family Macropodidae

Only one species of macropod, *Wallabia bicolor,* was observed in the area, but local residents reported that several Grey Kangaroos, *Macropus giganteus,* were often seen, until recently, in an area of open woodland abutting the eastern border of the survey block.

12. Black Wallaby, *Wallabia bicolor* (Desmarest).

This species was very common in the area. Wallabies were seen on all but one visit and a number of skeletons and skulls were found. Some indication of population density may be given by the record of 7 individuals seen on the eastern side of the block on one evening. From previous sightings on the western border there were possibly as many again in the area. Their mobility and wide foraging probably accounts for the great disparity in numbers seen on different occasions during the survey period.

Specimens: Pick-up skulls: MB.1880 unsexed, 18.ii.1967; MB.1881 unsexed, 12.xi.1966.

Order Chiroptera

Sub-Order Microchiroptera

Bats were commonly seen during the evenings, hawking for insects along the roads. Mist nets and a Constantine trap were used in attempts to capture specimens but only one capture was made. The varied sizes and flight patterns observed seemed to indicate that a number of species was present in the area.

13. Little Bat, *Eptesicus pumilis* (Gray).

The single specimen collected was captured in a mist net strung across Sargent's Road just north of the creek. An analysis of the ultrasonic frequencies emitted was made, giving a reading of 40Kc, in the range 30-50Kc.

Specimen: In spirit: ♂, 18.ii.1967.

Order Rodentia

Four species were collected in the survey area and it is unlikely that further species were present.

14. Allied Rat, *Rattus fuscipes* (Waterhouse).
(= *Rattus assimilis* (Gould)).

With *Antechinus stuartii,* this species was the most common small mammal in the area. Specimens were trapped throughout the survey area but appeared to be concentrated in the denser, wetter regions about the creek, in areas where the ground vegetation was mainly *Blechnum nudum* and *Lepidosperma* sp. Specimens were also taken in dense undergrowth of *Gahnia* sp. and *Bauera rubioides.* Individuals were captured during all seasons with consistent frequency.

Specimens: Skins and skulls: R.3084 ♀, 26.vi.1966; R.3084 ♂, 26.vi.1966.

15. Swamp Rat, *Rattus lutreolus* (Gray).

Apparently far less common than *Rattus fuscipes,* and restricted to the western boundary of the area in very dense undergrowth of *Pteridium esculentum, Tetrarrhena juncea, Bauera rubioides, Hakea sericea* and *Leptospermum juniperinum.*

Specimens: Skin and skull: R.3091 ♂, 13.xi.1966; in spirit: R.3125 ♂, 28.iii.1967.

16. House Mouse, *Mus musculus* (Linnaeus).

No specimens of this introduced species were taken in cage traps in the

area. One animal was found, freshly dead, on the ground near the camp. It appeared to have been "mouthed", as the fur was damp and slicked down around the mid-region.

Specimen: In spirit: R.3140 ♂, 11.xi. 1967.

17. Water Rat, *Hydromys chrysogaster*. (Geoffroy)

Although a fairly concentrated effort was made in trapping the creek banks, only one specimen, a young male, was collected. The creek is narrow and shallow in the area, and possibly the animal was ranging a considerable distance from its home territory. No feeding tables or burrows were found along the creek.

Specimen: Skin and skull: R.3124 ♂, 26.iii.1967.

Order Lagomorpha

18. Rabbit, *Oryctolagus cuniculus* (Linnaeus).

No animals were seen in the area by day, and on only one occasion were they seen at night, feeding on the cleared land abutting the south-western corner of the block. It seems that local control measures have reduced the population to a low level and the remaining animals are concentrated in the cleared farming areas.

Order Carnivora

19. Fox, *Vulpes vulpes* (Linnaeus).

Apparently widespread throughout this and surrounding areas, but no animals were sighted. Many scats were found, mostly containing insect remains.

Discussion

The presence of twelve marsupial, seven placental and one monotreme species in this area of forest was unexpected and, if typical of similar forest in this part of the State, indicated that the effects of various types of development on the environment have not been as serious as is sometimes thought. Accounts of the original forest in the 1880's (South Gippsland Development League 1966 p. 16 ff.) indicate that the vegetation throughout most of South Gippsland was fairly uniform. At that time mammals recorded as being present in this forest were Echidna, Platypus, Tiger Cat, Bandicoot, Wombat, Koala, Bobuck, "Squirrel" (probably both *Petaurus* and *Schoinobates*), Wallaby, Pademelon, "Kangaroo Rat" (probably *Potorous*), Mice (possibly *Antechinus*), Bush Rat and Dingo. (Elms, F. P. p. 34, Black, J. A. p. 254, Rainbow, J. p. 323, and Haig, W. McK. p. 327 in "The Land of the Lyre Bird", 1920.)

Only four of these species are no longer found in this area, viz. Tiger Cat, *Potorous*, Pademelon and Dingo. With the exception of the dingo (which was probably deliberately reduced in numbers by man), none of these species is at all common in Victoria at present. Thus the effects of large scale clearing during early settlement of the area and several severe bush fires have not apparently affected the number of species present very greatly. Calaby (1965), reporting on the fauna of a much larger area in north-east New South Wales found this same pattern. It is probable that residual populations of the species now present survived in uncleared areas during early settlement, thus providing a reservoir for re-population of forest which has been permitted to re-establish.

While the intensity and regularity of the survey methods were not sufficient to give a reliable indication of population density, the frequency with which certain species were encountered indicated a fair abundance (see

Table III and Systematic Account in Mammals). Our observations of the general condition of the vegetation throughout the period of the survey did not suggest that there was a shortage of food, at least for the herbivores and omnivores. At least three species of owl and the Tawny Frogmouth are resident in the area. Predation by these and also by fox could be important factors in limiting populations of most of the species encountered. There was also some evidence of wallabies being shot by man.

TABLE IV

Systematic list of mammals of the Darlimurla area

Order Monotremata	
Family Tachyglossidae	
(1) Echidna	*Tachyglossus aculeatus* (Shaw)
Order Marsupialia	
Family Dasyuridae	
(2) Brown Phascogale	*Antechinus stuartii* (MacLeay)
(3) Swainson's Phascogale	*Antechinus swainsonii* (Waterhouse)
Family Peramelidae	
(4) Short-nosed Bandicoot	*Isoodon obesulus* (Shaw and Nodder)
(5) Long-nosed Bandicoot	*Perameles nasuta* (Geoffroy)
Family Vombatidae	
(6) Wombat	*Vombatus hirsutus* (Perry)
Family Phalangeridae	
(7) Bobuck	*Trichosurus caninus* (Ogilby)
(8) Ringtail	*Pseudocheirus peregrinus* (Boddaert)
(9) Feathertail	*Acrobates pygmaeus* (Shaw)
Sugar Glider	*Petaurus breviceps* (Waterhouse)
(10) Greater Glider	*Schoinobates volans* (Kerr)
(11) Koala	*Phascolarctos cinereus* (Goldfuss)
Family Macropodidae	
(12) Black Wallaby	*Wallabia bicolor* (Desmarest)
Order Chiroptera	
Sub-order Microchiroptera	
Family Vespertilionidae	
(13) Little Bat	*Eptesicus pumilis* (Gray)
Order Rodentia	
Family Muridae	
(14) Allied Rat	*Rattus fuscipes* (Waterhouse)
(15) Swamp Rat	*Rattus lutreolus* (Gray)
(16) House Mouse	*Mus musculus* (Linnaeus)
(17) Water Rat	*Hydromys chrysogaster* (Geoffroy)
Order Lagomorpha	
Family Leporidae	
(18) Rabbit	*Oryctolagus cuniculus* (Linnaeus)
Order Carnivora	
Family Canidae	
(19) Fox	*Vulpes vulpes* (Linnaeus)

Acknowledgements

The authors acknowledge the careful field work and recording undertaken by the following members of the Mammal Survey Group: H. Beste, R. Cowling, R. Frankenberg, R. Fryer, D. Hackett, E. Hamilton-Smith, P. Homan, Jess Howard, A. Howard, C. Hutchinson, W. King (Chairman), D. Munro, Glen Seebeck, A. Spate, I. Temby and Jill Wolfenden.

Protected species of mammals were handled under the provision of permits issued by the Fisheries and Wildlife Department, who also assisted with the loan of traps. Equipment used in the survey was obtained with a grant from the M. A. Ingram Trust. The maps were drawn by Liki Muceniekas and J. K. Dempster and R. M. Warneke read the manuscript.

References

Atlas of Australian Soils (1961). Melbourne–Tasmania area, Sheet 2. Commonwealth Government Printer.

Calaby, J. H. (1965). Mammals of the Upper Richmond and Clarence Rivers, New South Wales. C.S.I.R.O. Div. of Wildlife Research. Tech. Pap. No. 10.

South Gippsland Development League. "The Land of the Lyre Bird", 2nd Edition, 1966. Shire of Korumburra.

Addendum

The Forests Commission was not informed by the local naturalists of their intention to request preservation of this block of forest until clearing of adjacent forest by the Commission had actually begun. Although the greatest courtesy and co-operation was extended by the Commission, it was, at that stage, too late to replan the reafforestation scheme for the area to preserve the survey area. However, an alternative block has been offered for retention and this will be reported on in due course.

Mammal Survey Group

Mammals of the Metropolitan Area

In addition to the surveys being undertaken further afield, the Mammal Survey Group is commencing a survey of the mammals of the Metropolitan area. This will be based largely on locality records for mammals in the Melbourne suburbs, with attention being directed initially at the two possums common in Melbourne, the ringtail *Pseudocheirus lanuginosus* and the brushtail *Trichosurus vulpecula.*

The group therefore requests all F.N.C.V. members to help. Reports of sighting of either of these possums (or any other non-domestic mammal) would be greatly appreciated in expanding our records. All data will be plotted on a map of the Melbourne area. Specific details of localities are needed, so that they can be pin-pointed in a street directory, with details of date, time of day and surroundings.

Information should be sent to the Hon. Secretary, Mammal Survey Group, 40 Howard Street, Reservoir.

Readers' Nature Notes and Queries

These columns are available for all members, young and old, to bring before others their own observations in nature. Correspondence may be sent to the Editor, 54 St. James Road, Heidelberg.

These notes come from Mrs. Ellen Lyndon of Leongatha in Victoria.

Mudlark co-operation

This concerns a greedy Magpie which was observed standing over an opened school lunch that had been dropped on the road. He was, quite frankly, full! A pair of Mudlarks, noting this happy position, came along for their share, but the Magpie would not allow them near. The Mudlarks separated and came in from different directions. When the Magpie savagely pursued one bird the other raced in and picked up what food it could. As it in its turn was chased away, the other darted in. It happened on the roadway outside our gate, and we were much amused at the antics of these cheerful scavengers. We noted that the Magpies are always closely watched by the Mudlarks, and the two species are never far apart. If there is a Magpie in the bird bath, the Mudlark pair are handy, one sitting on the bath edge and the other on a post. When the Magpie hops out and begins to preen his feathers they will dive bomb him, clacking their bills in the most aggravating fashion right in his ear. All this is taken in very good part by the patient Magpie who sometimes turns his head over his shoulder and carols at them.

Mistletoe Bird Nesting Site

Birds sometimes choose foolish places in which to build their nests. We had under observation this summer, a pair of Mistletoe Birds, building in a Koonwarra garden. In early December the birds selected the tender outer tip of a branch on a Liquid Amber, which stood in a draughty spot between the house and the hedge. There followed a windy period when the little silken bootee swung back and forth all day in a full half circle. The nests are apparently anchored at only one point at the top. This nest was never used.

Wattle-bird and Kookaburra

At Halls Gap, in the Grampians, during October 1967, we saw a most peculiar sight. What appeared to be a new bird whizzed by; a bird which apparently had a double set of wings! There was a dash for binoculars and a more careful examination showed something we were to see repeated many times in the following days. A Kookaburra hurtling back to the bush with an irate Red Wattlebird hanging fast to its tail feathers. Their wings flapping in unison created a rather startling effect.

* * *

Magpie overcomes disability

This interesting item comes from Mr. A. G. Fellows of Alabama Hill, Charters Towers, North Queensland.

A once wild, but now very tame magpie gets its twice-a-day meat ration at my home because of a peculiar happening. The bird appeared one day on our lawn, looking very dejected, and no wonder. Its beak had somehow been injured, and now had a scissor-like mal-adjustment. To swallow was almost impossible, as most food was lost in any attempt. The bird's mate, always very timid, would leave the sick bird if I showed myself at the door, whereas the injured one would come to within ten feet of me and look upwards for help it seemed. But what to do?

A neighbour called and noticed the bird on the lawn, remarking that it used to visit her home frequently until just lately. But her next remark surprised me.

Stating that "maggie's" beak was much better now, I sought an explanation and was told the beak was formerly so distorted that the poor creature just stood on the lady's lawn, gradually starving.

Then she and her husband witnessed a strange sight. The bird's mate brought something which it forced into the sick bird's throat.

They later told me it was rather like a baby magpie being fed. Twice this event was witnessed, but then they missed the two birds. That was when they came to stay at my place a quarter of a mile away.

Now, after five months journeying between both of their "homes", the birds come and go as they please.

Meanwhile the "skew-beak" is fast straightening, and "maggie" gets her share easier now despite opposition by two arrogant mudlarks, who come on to the back step without hesitation.

Lately I have heard efforts at carolling by "maggie", and two days ago, having made a tape-recording of some music, I played the tape back while watering the garden. I chanced to look towards the machine, and "maggie" was standing ten feet from it on the lawn, looking towards it, but motionless. During a pause in the music, I distinctly heard "maggie" softly carolling for a few moments. As the music played again. I noticed "maggie's" throat and beak move gently.

What gratification that action gave me. The latest development is that, from the bird's favourite perch high in a gnarled "china-apple" tree near the house, the sounds of birds, human voice and other imitations are heard, all issuing from "maggie".

At a call, the bird will now come to the sidedoor steps, and despite claims by the two mudlarks that fear nothing, four quiet butcher birds (two of which come up the steps), and occasionally two "foreign" magpies; the once sick bird, now with a glossy plumage, has been added to our "family".

Sandy Point on Waratah Bay

Here are some more travel notes from Victor Jacobs.

In September last, a walk along the beach disclosed a number of dead birds at the most recent high tide mark. The first was a Great-winged Petrel (also called Grey-faced Petrel), and bobbing on the water in the surf was another of this species. As we approached the water it was washed to within a few feet of us and made only very feeble swimming motions. Another carcase, also recently dead, was a Dove Prion. The other dead birds were all Fairy Penguins—8 of them in all. These varied from empty skins to firm bodied sheeny carcases. Two live Pacific Gulls patrolled the shore but live birds were outnumbered by the dead.

We remained on Sandy Point, and noticed that Little Wattle-birds and Red Wattle-birds were common in the dense scrub bordering the coastal dunes. A flock of the Grey-breasted form of the Grey-backed Silvereye was seen. Grey thrushes too, and a few Yellow-winged Honeyeaters were seen, and a patchy young Crimson Rosella. The Brown Thornbills in the area were very rusty looking underneath.

In spite of a cool south wind it was pleasant scrambling through the scrub where no wind penetrated. In the shade, the white berried elderberry was in fruit, and I recorded Grey Fantails, Blue Wrens, Goldfinches, and a pair of young Silvereyes which apparently came to see what I was. Two Yellow-billed Cormorants flew seawards. I saw one starling with a jet black head and brilliant white speckles. Scrub Wrens called from the Boxthorns. A stocky finch-like bird called "ooo-eee", and I saw it clearly and watched it at length. The general colour was a speckly light brown with the upper breast distinctly yellow. However it did not match with my bird pictures.

By this time I had moved about one mile to the west, so I crossed the dunes and turned east, braving the keen wind. The shore was thinly shared by Pacific Gulls, Silver Gulls and one Oyster Catcher.

A further five dead Fairy Penguins were seen in various stages of decomposition; providing a rather sad ending to a most pleasant excursion.

Victorian Orchids No. 13

by C. E. Gray

Photo: C. E. Gray

If the season is right, the coming of Autumn can be heralded by the fluttering white wings of *Eriochilus cucullatus*. "Autumn Wings" is a very apt vernacular name, and so too is the other widely used "Parsons' Bands". The latter refers to the wide white (sometimes pale pinkish) lateral sepals, which do resemble the phylacteries worn by a number of the clergy.

The petals are dark, small and insignificant, standing erect, close on either side of the column. It is the column structure which makes this orchid of particular interest. It forms a long, narrow pouch, the opening of which is situated at the front, near the top. The lower edge is quite sticky, and it is possible to open the pouch by placing something against the edge and gently pulling downward.

In her book, "Orchids of the West", Rica Erickson describes how a small native bee performs the process of pollination of a Western Australian species in just such a way. The essential elements of stigma and pollinia are so arranged that the insect, in pushing into the pouch will deposit any pollen it carries well inside the sac, and, in retreating will neatly collect new pollinia to carry with it.

I had lived on a hillside for nearly 15 years, always seeking new specimens to record, before I was fortunate enough to see the area come alive with these flowers. Perhaps this dry season will bring them up in numbers again.

Victoria has recorded only this one of a genus of five species confined to Australia. It is widespread.

The Aboriginal Fish-Traps at Homerton

by Aldo Massola*

Illustrations by Author

Stony Rises is the name given to a stretch of country covered by a geologically recent lava flow, the surface of which exhibits a labyrinth of cracked basalt ridges or barriers, up to 30 or 40 feet in height, broken by irregular valleys, basins, and troughs. The cracking of the basalt is due to the cooling process of the lava, and rocks of all sizes are thus formed and then tumbled down in wild confusion. The troughs and valleys are due to the collapse and sinking of the surface crust, caused by the flowing out of the liquid lava supporting it. As can be imagined, this type of country can be traversed on foot only with the greatest difficulty, and on horseback not at all, since, to make matters worse, the stones are often hidden from view by a thick growth of bracken, so that it becomes impossible to see where one steps; and tiger snakes abound.

In Western Victoria there are several unconnected areas of country covered with "the stones", the basalt having originated from the eruptions at a number of mounts, such as Napier, Rouse, Eccles, and Porndon, just to name a few. Each of these areas varies greatly in extent, but all were, in the early days of settlement, regarded as hot-beds of "wild" aborigines. They set forth from their camps and hide-outs in the stones to raid the settlers' flocks and herds, and retired into them with their booty, secure from pursuit by the white men. The latter could not take their horses in, and did not relish venturing on foot in such difficult country. It was not until the Native Police Corps was formed, the members of which were quite at home in the stones, that the menace was removed.

The particular stony rises with which we are here concerned, however, is important, not for being the scene of one of these acts of "guerilla warfare", or of a "punitive action", but because it guards one of the more peaceful contrivances of the aborigines: a fish trap. I am aware that trapping fish in the Stony Rises sounds absurd, and I hasten to explain:

The area under discussion is situated south of Lake Condah and east of Homerton, and the stones covering it were the lava flow from Mt. Eccles. Lake Condah (now drained) was formed by this flow damming back Darlot's Creek. When the lake was full it overflowed at its lowest points, which were its south and south-west corners, through the cracks in, and underneath the basalt ridges which dammed it. The overflow thus formed a number of springs and seasonal watercourses, which followed the low ground of the valleys marginal to the lava barriers; and after meandering in a general south-westerly direction, ultimately joined the lower reaches of Darlot's Creek.

Lake Condah and the associated Stony Rises was originally the home of the Gourndítch-mara, a powerful tribe, the members of which were

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divided into a number of groups, each taking its name from the locality they inhabited. Thus, for example, the group living on the lake proper was the Kerup, and the one living along Darlot's Creek was called Killger. Both these groups are known to have included fish in their diet, caught by constructing fish traps, but since the idea was widespread amongst the aboriginal tribes, it is possible that the others did this also. At any rate, the use of traps continued at Lake Condah even after 1867, when an Aboriginal Reserve and Mission were established there, for a report dated 1875 mentions that they were then in use, "but not so fully as in former days". Then, in 1893, possibly because the Government's rations to the Reserve had been greatly reduced, it was reported that "large quantities of fish were being secured during the winter months by means of traps".

The traps referred to were constructed on the south-west point of the lake. Because of the peculiarity of the ground configuration, the lake received the drainage of a large extent of country, and, in the winter, rose rapidly to its overflow point. The water then poured out, not only through the cracks in the basalt ridges, along its margin, but also along the channels which the natives made by removing loose stones and even some of the more solid rock-face. The fish traps were constructed at suitable places across the path of the water in order to trap the fish leaving the lake with the overflow.

They consisted of low wing-walls of stones which restricted the passage of the water to a gap between 1 and 2 feet in width, which was left in the centre. At these openings strong bag-nets were fastened, and into these would pile the fish, mostly eels and tupong, which the current enticed to leave the lake. These bag-nets were made of plaited reeds, and were 10 feet or more in length, and over 2 feet in diameter at the mouth but soon contracting to only about 4 or 5 inches, so that the fish would not have enough space to turn around and swim back and out.

As well as these traps, wooden bar-

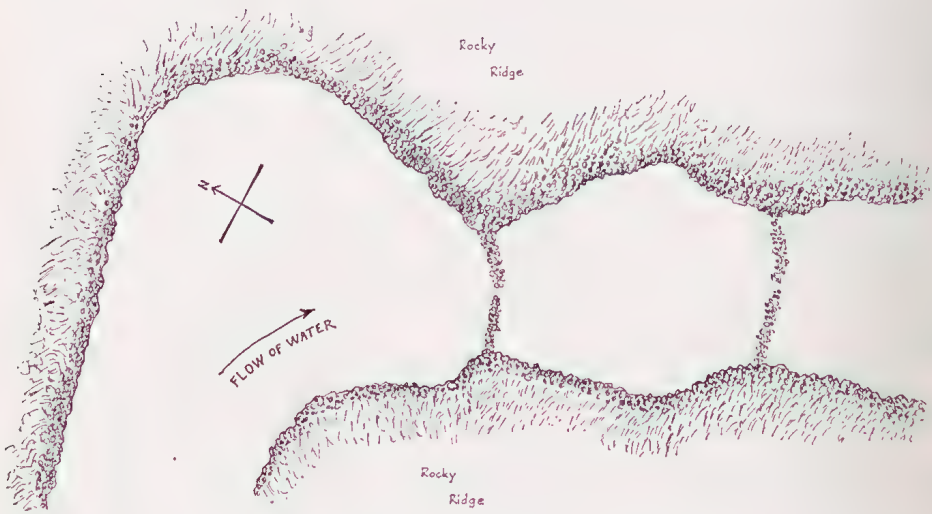


Fig. 1—General arrangement of Fish-traps described in text.

ricades were constructed each winter across the overflow of the lake into Darlot's Creek. These were erected with strong forked stakes, horizontal spars, and vertical stakes, the whole re-inforced with piles of stones. Here and there openings were left for the water to rush through, and at these points bag-nets were placed.

Gradually, however, as the number of aborigines at the Reserve diminished, the traps were allowed to fall into disrepair; the end came with the closing down of that Institution in 1918, and the removal of most of the few remaining inhabitants to Lake Tyers, in Gippsland. Nevertheless, the plan of the fisheries is still clearly discernible by the accumulations of stones tumbled down from the walls.

What is not generally known is that the traps were not limited to the immediate vicinity of the Lake; several are in close proximity to the old Mission Station and one is still recognizable at the "S" bend of Darlot's Creek, about a mile upstream from Little Dunmore bridge, and about 1½ miles to the south of the Mission Station.

Traps were also erected in the Stony Rises, across some of the valleys which carried the overflow from the lake. This fact was stressed by Mr. Noel Learmonth the well-known naturalist and historian of Portland; and he volunteered to guide us† to one which had been discovered some time previously by his brother, Mr. Cecil Learmonth, and from whom he had obtained full directions as to its location. Both he and his brother know the whereabouts of other traps in the stones, but this particular one was noteworthy because it was in perfect condition. Naturally, we accepted the offer with alacrity.

Homerton Fish-traps—No. 1 wall with centre opening shown.

It is not here proposed to enlarge on the difficulties encountered in walking in this type of country; suffice it to say that, in due course, we, or rather, Mr. Learmonth located the trap, which was found to be undisturbed. I was thus enabled to note the following particulars:

The trap is about 5 miles south-west of Lake Condah and one mile east of Homerton; and is situated about one mile in from the south-west edge of the Mt. Eccles stones. The rises at that point have all the characteristics of this type of country, consisting of the usual barriers separated by depressions and valleys. Three of the latter meander in parallel courses. The most westerly contains deep, still water, covered with a yellow scum, and overgrown with reeds. The valley to the east was dry, but quite deep, and would probably carry too much water to be of any use as a fish trap. The valley in the centre was also dry, but it is only 3 feet deep (measuring from the base of the barriers); and this one must have been deemed to be right by the aborigines, since they erected

† My companion on this trip was Mr. Eric Barber, formerly of Horsham, now of Narrawong, the discoverer of the Toolondo fish traps, in the Wimmera (see *Vict. Nat.* 79, 1962), and co-discoverer of a number of painted shelters in the Grampians (see *Vict. Nat.* 81, 1964).

two sets of wing-walls across it, at two of the narrowest points.

The first, or most northerly stone wall is 45 feet long, with a 3 feet opening at the centre, where it is 3 feet high. It is not straight across the valley, but, seen from above, it is shaped like a funnel, the centre opening being 12 feet south of an imaginary straight line drawn across the two starting points of the "mouth". The second wall is 168 feet south of the first, and is 54 feet long, with a 3 feet opening at the centre, where it is also 3 feet high. The centre opening of this wall is 3 feet south of an imaginary straight line. In both cases the mouth of the funnel faces north, or the direction from where the current would come; and bag-nets would have been secured at the centre openings for the reception of the fish which came down with the current.

There is ample evidence of the passage of water through the centre gaps, where the stones show distinct signs of water-wear; and most of the stones forming the base of the walls are half-buried in the silt carried down by the current over the years.

The most northerly wall appears to have been the more important since it was erected with greater care; the stones are better fitted, and the funnel is much deeper in plan, the shape and depth of which would ensure that the fish be guided into the bag-net. The second wall was probably only erected to trap any fish which might have got through the first. A third wall was apparently unnecessary.

It is, of course, obvious that these traps could only be used when the overflow from Lake Condah reached them, and that they would be useless during the summer months. This fact illustrates once more the great powers of observation possessed by the aborigines, as well as their amazing ability to live "off the land"; for, who would think of "fishing" in this waste of rocks?

Camps and cooking ovens of this tribal group can still be seen along the east bank of Darlot's Creek, where they stretch from Homerton to the junction with the Fitzroy River; some fine examples of ovens being at a noticeable bend of the creek, about 2 miles north of Tyrendarra. These must have been the group's summer camps, whilst the "caves", or sink-holes, in the stones provided shelter in the winter, when the Homerton fish traps would become operative.

I wish to express my thanks to Messrs. Cecil and Noel Learmonth, respectively for the information and directions, and for guiding me to these unique fish-traps; and to Mr. Eric Barber for once again sharing with me the fatigues, and the pleasures, of a field trip. Together they have enabled me to place on record a very interesting aboriginal antiquity.

No. 1 wall with author looking at centre opening. Funnel shape of wall may be seen.

Close to Nature

by G. M. WARD

Illustrations by Author

How many of us realize just how close we are to nature; and with what little effort it can be studied?

From the fluttering moth at a lighted window, to the spiders in the darkest corner of our garden shed; the wonders of the natural world are numerous—to the careful and patient observer!

This is a series in which a look is taken at some of these creatures which make up this "world in the garden". The aim is not to provide a completely scientific treatise on each subject; but rather to provide enough general detail to stimulate an interest in the things around us.

If the series encourages us not only to look; but to see something in what we are looking at, then it will have served its purpose.

A common inhabitant of our gardens often taken for granted, and which for generations has provided youngsters with an opportunity for elementary nature study, is the Casemoth or Bagmoth.

Actually, this family of Casemoths is large and worldwide; with about twenty species being resident in Australia. Some of those in Europe are quite small; while those in warmer climates tend to be larger, as is the case of the most common species to be found in Melbourne suburbs. This is Saunders Casemoth, which may sometimes have a case of six inches in length. The accompanying photographs show two stages in the growth of such a case.

This species however is not the only one confined to the Melbourne area. Two others which I came across earlier this year were the Ribbed Casemoth and the Lictor or Faggot Casemoth. Some years ago I did find a fourth species—the Leaf Casemoth; but I have not seen one since.

In September 1967, when I spent some time in northern parts of Victoria near the Murray River, the Lictor Casemoth was very common.

From the illustrations, it is quite apparent that the construction of the silken case is quite varied in each species; and for the keen and patient observer there awaits sufficient reward in establishing the reasons for these variations.

The method of progression of the caterpillars is one of interest; and whenever I watch this I always tend to imagine myself climbing a tree with a bag of cement tied to my back. The drawings shown in Figure 1 illustrate the foreleg movements. After these leg movements the case is drawn upwards by a muscular contraction of the lower section of the body of the caterpillar.

This procedure is necessarily slow; but it is precise, and with very little risk of failure. On one occasion with a Saunders Casemoth, I recorded a time of 20 minutes for a climb of 3 feet vertically, on the smooth trunk of a eucalypt.

The active caterpillar is abroad for about one year, feeding and enlarging the case; and according to Leach in *Australian Nature Studies*, it is about February that the wingless female casemoth protrudes the end of her abdomen from the lower end of the case, is fertilized by the winged male, and deposits the eggs inside the case. After five or six weeks, the emergent young lower themselves on

Upper left; lower right—Two stages in the growth of Saunders' Casemoth.

Lower left—Case of the Ribbed Casemoth.

Upper right—Lictor Casemoth attached to case of Ribbed species.

silken threads to the ground, spin for themselves conical cases of silk looking like small dunce's caps, and begin the cycle of events once more.

During the winter, the case hangs from some support reasonably high above ground. Quite often, one sees the Saunders Casemoth suspended from overhead wires or roof guttering.

I have had the three species shown in the accompanying photographs, under observation since February last. They have not (up to this date) moved from their positions which were taken up at the beginning of April. In fact I have a feeling that there may be no further developments. However, if we are lucky enough to have chosen males of the species, and maturity is reached with the emergence of the moth; we shall have the basis of another article in this series, for the moths of these larvae are not often noticed due to their swift nightly flights, on which they batter themselves about in search of a mate. Here's hoping.

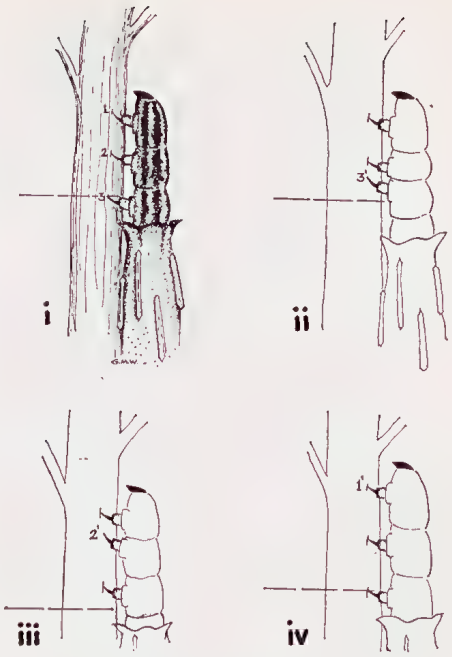
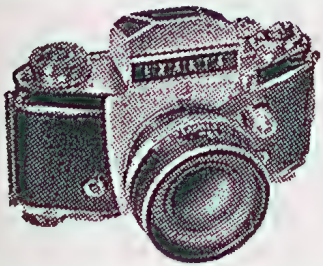


FIG. 1—Showing leg movement of larva of Saunders Casemoth.



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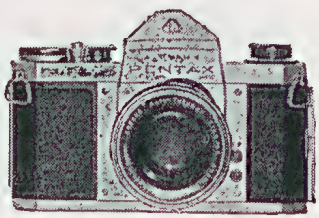

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Victorian Warblers

By Roy Wheeler, B.O.C.

The Warbler family—*Gerygone*—is represented by three species in Victoria. Two of them are more or less resident and the other is a migrant.

The Brown Warbler (*Gerygone richmondi*) is confined in Victoria to the coastal jungle-type rain forests in Eastern Victoria, from the Howe Range bordering New South Wales, through to the Mitchell River gorge near Bairnsdale. They occur in several of our East Gippsland National Parks such as Mallacoota, Wingan, Alfred and Glenaladale. There, amongst masses of treefern, lilly-pilly, eucalypts and wattles, the Brown Warbler is at home. At times these jungle pockets border on the Tasman Sea, and then the lively call of the species—"What is it", "What is it", "What is it"—mingles with the roar of the surf on the nearby beaches.

The range of the Brown Warbler is the thick belts of rain forest which occur from South-eastern Queensland down through eastern New South Wales to the Mitchell River in Victoria; the southern extremity of its range. This bird is only 4 inches in length. The crown and upper parts of the plumage are dark brown slightly tinged with olive, while the throat and chest are greyish, and the abdomen and under-tail white. The tail has a broad band of darker brown edged with white, and the eye is reddish with the bill and feet blackish.

The other resident species is the Western Warbler (*Gerygone fusca*) which has a range covering most of Northern Victoria, with penetrations through to the Central regions including the Melbourne area. Its Australia-wide range covers a large part of Western, Central and South-eastern Australia, west of the Great Dividing Range. One of the loveliest songsters of the open bushlands, its call was once most aptly described by Alan Bell in the following words:

> "I have never heard sounds so plaintively microscopic, so clear and yet scarcely perceptible. The ghost of a kitten's mew—the echo of dwarf violins played in the moon—these were the bird's notes".

This species is 3½ inches in length. The upper parts are olive-brown, the under parts light grey, and there is a dull white patch near the base of the bill. The tail is dark brown, with the outer feathers having a broad white band towards the base, and is conspicuously spotted wih white near the tip. The eye is reddish and the bill and feet black.

I will always remember, when on a Bird Observers Club weekend outing to Maryborough in north-central Victoria in late November 1955, we found a pair of Western Warblers busy nest building in a sapling not far from the town. One of our well known lady members was so fascinated by the song and activity of this pair that she revisited the spot several times over the weekend. Other places I have seen this species within the State are at Mystic Park, Bendigo, Nagambie, Cobram and Whorouly. It was reported at the You Yangs in November

Brown Warbler at Nest.

Photo: N. A. Chaffer.
Block by courtesy of R.A.O.U.

1957 and in a garden at Black Rock, a Melbourne suburb, in December 1964.

The third species is the White-throated Warbler (*Gerygone olivacea*) and is strictly migratory, arriving in eastern and north-eastern Victoria in October and November. From then until after Christmas, its lovely song is heard in many parts of the open bushlands, particularly along the creeks and rivers. Its range is New Guinea and Northern and Eastern Australia. The song is very similar to that of the Western Warbler, a song that appears to have no starting and no ending. *Gerygone* is a Greek word meaning "born of sound", and it describes this delightful bird song perfectly. This species is 4¼ inches long. The entire upper surface is olive-brown, the throat is white, and the under surface a bright yellow. The tail is tipped with white, and the eye is scarlet, with the feet and bill blackish.

In Victoria this species penetrates from the eastern parts of the State to the Central and Western districts. It has been reported in the Otways and at Coleraine in the far Western District. The one South Australian record is at Millicent in November 1938. It has been reported a number of times in and around Melbourne, and from Werribee and the You Yangs, where it has nested in recent years. The young birds have yellow throats. The species leaves Victoria in early Autumn.

The Brown Warbler searches for insects in outer foliage mainly, and has the habit of fluttering before the leaves in Weebill fashion. The Western Warbler on the other hand has a liking for the tree top foliage in its search for food, and moves quickly from tree to tree; whilst the White-throated Warbler seems to favour both tree top and outer foliage. Common to the three species is the fact that their food consists mainly of insects of various types.

Although the nests of the three species are similar in design, the construction varies a little in each case. All nests are rounded in shape, having an opening near the top with a hooded entrance. Each nest has a tail, and are usually about 8 inches long. They are mainly constructed of fine bark, grasses or spider webs, and are lined with feathers. Usually they are suspended from a thin branch in the rain forest in the case of the Brown Warbler, or from a leafy branch of a sapling or tree with the other two species. Heights vary from 5 feet to 60 feet. The two or three eggs are whitish, with reddish or purplish spots. Breeding in Victoria is from November to January.

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Notes from the Diary of an Inner-city Birdwatcher

By Edna B. King

As I am a resident of a heavily built-up inner suburb, North Melbourne, one would expect bird-watching to be a somewhat unrewarding pastime (unless one was a male and interested in the female species of homo sapiens). However, due to very restricted free time to "go bush", I decided to keep a diary of birds observed over a period of 3-4 months, in and around my garden, and in adjacent parks and streets; and by doing so have been pleasantly surprised at the variety and numbers to be seen.

Disregarding the plentiful numbers of introduced avifauna such as starlings, blackbirds, Indian minas, sparrows, pigeons and turtle doves, the following sightings and identifications(?) were made from early January to late May, 1968.

White-Plumed Honeyeaters have been noted in flocks of from 4 to 12 almost weekly during most of this period, usually in an *Acacia baileyana*. As this tree has not flowered this year, I have concluded that the birds are insectivorous as well as nectar feeders, and an inspection revealed a heavy infestation of aphids on the foliage. The rain that fell in early April caused the large *Eucalyptus ficifolia* trees planted down the centre of my street, to burst into blossoms on which the honeyeaters feasted, whilst conducting noisy battles with the sparrows.

During the hottest and driest weeks of February and March, on three occasions, flocks of Little Corellas and Sulphur-Crested Cockatoos, accompanied by an odd galah or two, were seen in Royal Park. These flocks, estimated to number from 20 to 40 birds, were feeding amongst wheat straw, which had been placed around trees as mulch.

The prolonged drought conditions which had prevailed in inland areas, and the resulting shortage of natural food, could have been the cause for such large numbers being seen in the city.

In early April, on investigating a noisy quarrel in a large pear tree growing in a neighbour's garden, a Yellow-faced Honeyeater was found to be the cause of the disturbance. This slim, olive-backed bird with a brilliant yellow flash on the cheeks, was being harassed by the resident sparrows and blackbirds and was quickly driven off.

On another occasion, I noted a pair of birds feeding on ripe figs in another neighbouring garden. They greatly resembled the fig birds commonly seen in the Moreton Bay fig trees on the North Coast of N.S.W. and Brisbane environs. According to Cayley (1966) and Hill (1967), the description tallies with that given for the Southern Fig Bird. If my conclusions are right, and this was such a pair, I would be very interested if any other members have observed them in Melbourne, as I believe that they are only occasional visitors.

Late in April, a stroll around the perimeter of Royal Park early one Sunday morning, produced the following observations. A family of White-backed Magpies were feeding on the ground in the vicinity of a *Eucalyptus melliodora*, where, last Spring, a particularly vicious pair had a nest. There were 2 adult and 2 young birds, so I supposed them to be last season's family. The Welcome Swallows were swooping and gliding across the play-

ing fields and a lone Black-faced Cuckoo Shrike sat still and alert in a high tree even though continually teased by four raucous Magpie Larks.

Further on, while crossing a cricket oval, a flash of colour caught my eye, and I was thrilled to see a Flame Robin and his drab little mate, hopping amongst the dry grasses. Close by, a shrill alarm sounded and two Spur-winged Plovers ran quickly across the oval, almost invisible against the dry ground. For the past four years I have noted Plovers in this same area, and on two occasions have found their nests with 4 brown olive coloured eggs, nestling in a grass lined depression amid blotched weed clumps.

Numerous Willy-wagtails chattered near the flocks of pigeons feeding on the ground and they appeared to be catching insects disturbed by the pigeons. In a patch of Pigface weed, two Goldfinches were feeding and were not disturbed until I came within a few feet of them. I was unaware that these birds frequented the inner city areas, as I have only observed them in coastal bush on Phillip Island and along the Gippsland coasts.

During most of May, numerous, noisy flocks of the Little Lorikeet, commonly called "greenies", were to be seen and heard, feeding on the blossoms of the *E. ficifolia* and strewing the roadway with the cream flowers. These birds appeared to be unaware of the approach of humans when feeding and continued with their screeching and acrobatics within a few feet of the watcher.

Perhaps I have not seen anything unusual in these past few months, for I am merely a tyro at bird-watching, but I have learned that there are rewards for the observant nature lover even in urban surroundings.

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The Field Naturalists Club of Victoria

General Meeting—12 June

150 members were present with the Vice-President, Mr. Jeffs in the Chair.

The subject for the evening was a talk by Messrs. Willis, Fuhrer and Rotherham entitled "Victorian Flowers and Plants in Colour". This was an outline on history and evolution of a book by that name which will be published shortly, and of which the three speakers were directly concerned. Mr. Fuhrer began by explaining how it all started. It originated in 1964 from an idea of Mr. J. Baines, who at that time had received a copy of a book, "New Zealand Plants in Colour", published by A. H. and A. W. Reed Pty. Ltd., a progressive N.Z. publishing firm. Mr. Baines contacted Professor Salmon of the University of Wellington, Caption Editor of this book, for information and advice in respect to having one published on Victorian Plants. He was referred to the publishing firm who showed willingness to do the job if the material was made available. After much discussion by the Botany Group it was decided to go a step further with the idea. Mr. Baines then contacted several authorities and experts in various fields, whose services would be required if the idea was to become a reality. Thus a working committee was formed. It consisted of Mr. J. Willis (of the National Herbarium), Caption Editor and Consulting Editor; Mr. R. Cochrane, Text Editor (now in New Zealand, but who, that time was Lecturer in Geography at Monash University); and Photographic Editors, Mr. Rotherham and himself. And so the book evolved.

Mr. Rotherham continued by explaining how he became involved in the production of the book. Being a keen Nature Photographer his work apparently caught the eye of Mr. Baines, with whom he worked on the staff of the Moonee Ponds School. He was invited to share the Photographic work with Mr. Fuhrer, to which he agreed. He said new photographic techniques had to be learnt and much experimentation into the use of electronic flash; and as a result, their knowledge of Wildflower Photography increased. He said that his knowledge of Botany, limited at the beginning of the venture, increased enormously in the two years of photographic work. He said that the first year was a dry one in which only 30 per cent of the material was obtained, so in the following year an enormous amount of time and travelling was necessary, sometimes well off the beaten track, to obtain the balance of the material. He gave many interesting anecdotes of his experiences during this time.

Mr. Willis continued by saying a little about his contribution. His work could not begin on the captions until all the photographic material had been obtained, as the layout had to be completed before captioning could begin. This left him only 12 months to complete the work.

Mr. Willis said that keeping uniformity throughout was a big problem. He said that some plants merit a wider description than others, but for the sake of uniformity, some pruning was necessary. Mr. Willis also spoke of the work done by the Text Editor, Mr. Ross Cochrane. He arranged the material into 14 ecological sections, "Plants of the Alps, "Plants of the Mallee", "Plants of the Marshes" and so on. He said that Mr. Cochrane made a special trip from New Zealand to complete the work. Mr. Willis spoke highly of the "Kyato Press", the Japanese printing firm and said that after going through the proofs, only about 20 mistakes occurred in 45,600 words, very good for a non-English speaking country. Mr. Willis then concluded by describing and commenting on some 60 odd slides, many of which were identical with the reproductions in the book. The President, in thanking the three speakers, spoke of the immensity of the undertaking and said he felt sure it would be a great success.

Exhibits

Mr. Woollard: Fruits of the White Box, *Eucalyptus alba.*

Mr. Swaby: *Pittosporum phillyraeoides.* (Weeping Pittosporum). *Eugenia paniculata* (Brush Cherry), specimen from the Sir Colin McKenzie Sanctuary, grown from a cutting by Mr. Swaby.

Mr. A. Lewis: *Cordyceps* (Vegetable Caterpillar.)

Microscopy Group Meeting—17 April

This meeting, chaired by Mr. P. Genery was a members' night with 16 members and 2 visitors present.

In the matters of business discussed, it was resolved that the 17th July be set as an open night for school children to visit us, and several speakers will then introduce them to the uses of the microscope. Mr. Trotter is to be liaison member on these arrangements.

Ten microscopes were available for viewing the various exhibits described in detail by each member as follows:

Mr. J. Strong: Blood smears.

Mr. D. McInnes. Rock slides

(a) Salzbergite from Brocks Monument near Romsey, a good example of correct thickness of section noted by texture, feldspars showed up in grey tones without colour interference.

(b) Basalt (Riddell's Creek), illustrated the hard dense rock with minute feldspar crystals.

(c) Diorite, Snowy Mountains area, showing hornblende crystal changes.

Mr. K. Trotter: Assembly of Tecktites and/or Australites. Also described was a new binocular microscope kindly loaned by Mr. Zonnerville of Scientific Industrial Instrument Co., Melbourne.

He described and demonstrated the scope of its capabilities together with accessories.

Mr. J. Milojkovic: Two slides showing arrangement of Diatoms.

Mr. P. Genery: (a) Lamprey Cordartus specimens. These 2 specimens were collected from the Yarra river, Fairfield near Australian Paper Mills, and were approx. 12 inches long and preserved in formaline solution.

Mr. Genery added a brief and informative description of their anatomical structure.

(b) Demonstration with two microscopes to illustrate illumination with Light Grating, producing spectrum colour of predetermined wave length of light.

(c) Fairy Fly.

(d) Dinoflagellata.

After further informal discussion of specimens, the meeting closed at 10.15 p.m.

The next meeting of the Microscopy Group is on 17 July 1968. An Open Night for visit by school children. Introduction to the microscope.

Botany Group Meeting—12 June

Seventeen members attended and Mr. B. Fuhrer was in the chair. The speaker for the evening was Mr. J. Jenkins, whose subject was "Botany of Macquarie Island". He screened slides of the island, which has a sub-Antarctic climate. is approximately twenty miles long and three miles wide. It has a high plateau of glacial origin. rising to about 1000 feet, and the coasts are very steep.

The flora is herbaceous, mainly grasslands. 35 species of plants, of which three are endemic, being found there. On the precipitous coasts *Poa foliosa* grows very luxuriantly, especially on the lower parts, together with *Poa hamiltonii*, an endemic species. On ground higher up another luxuriant plant is found, *Stilbocarpa polaris*, whereas on the upper slopes almost pure stands of *Pleurophyllum hookeri* are found. On the plateau itself other plants are found, including *Azorella umbellifera*, *Cotula plumosa* and *Juncus* sp.

Rabbits were introduced by sealers and there are causing some damage to the vegetation, speeding up erosion.

The chairman thanked Mr. Jenkins for his interesting talk and excellent slides.

F.N.C.V. DIARY OF COMING EVENTS

GENERAL MEETINGS

Monday, 8 July—General Meeting at National Herbarium, The Domain, South Yarra, commencing at 8 p.m.

1. Minutes, Reports, Announcements.
2. Correspondence.
3. Subject of evening—"Victoria to Broken Hill, via Cooktown". J. Ros. Garnet.
4. New Members—
   (a) *Country:*
   Mr. Robert F. Steel, 10 Queen Street, Regent 3073. (forwarding address only).
   (b) *Joint:*
   Mr. J. M. Howlett and Miss N. L. Howlett, 10 Alta Street, Canterbury 3126.
5. General Business.
6. Nature Notes and Exhibits.

GROUP MEETINGS

(8 p.m. at the National Herbarium unless otherwise stated)

Thursday, 11 July—Botany Group. Miss J. Galbraith will be guest speaker.

Wednesday, 17 July—Microscopical Group.

Friday, 26 July—Junior Meeting at 8 p.m. at Hawthorn Town Hall.

Thursday, 1 August—Mammal Survey Group; meets in Fisheries and Wildlife Dept. Library, 2nd floor, at 7.45 p.m.

Friday, 2 August—Junior Meeting at Rechabite Hall, 251 High Street, Preston, at 8 p.m.

Monday, 5 August—Entomology and Marine Biology Group. This group meets in Mr. Strong's rooms in Parliament House at 8 p.m. Enter through private entrance at south end of house.

Wednesday, 7 August—Geology Group.

FUTURE MEETINGS

Monday, 12 August—R. Wheeler—Birds.

Monday, 9 September—J. Willis—New Zealand for the Naturalist.

F.N.C.V. EXCURSIONS

Sunday 21 July—Healesville Sanctuary. The coach will leave Batman Avenue at 9.30 a.m., fare $1.50. Bring one meal and a snack.

31 August-8 September—Grampians. The coach will leave Melbourne on Saturday, 31 August, and remain with party for day trips. Accommodation has been booked at Grampians House for those in coach. The excursion will cost $60,00 and a deposit of $10.00 should be paid when booking and the balance by the end of July, all cheques being made out to "Excursion Trust". Day trips will be made in conjunction with the Ararat, Horsham, and Stawell F.N.C.'s.

Field Naturalists Club of Victoria

Established 1880

OBJECTS: To stimulate interest in natural history and to preserve and protect Australian fauna and flora.

Patron: His Excellency Major-General SIR ROHAN DELACOMBE, K.B.E., C.B., D.S.O.

Key Office-Bearers, 1968/69

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Vice-Presidents: MR. JEFFS, MR. T. SAULT

Immediate Past President: MR. W. L. WILLIAMS

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Hon. Editor: MR. G. M. WARD, 54 St. James Road, Heidelberg, 3084.

Hon. Librarian: MR. P. KELLY, c/o National Herbarium, The Domain, South Yarra, 3141.

Hon. Excursion Secretary: MISS M. ALLENDER, 19 Hawthorn Avenue, Caulfield 3161.

Subscription Secretary: MRS. N. E. LEWIS, 1 Billing Street, Springvale 3171. (546 4649).)

Group Secretaries:

Botany: MR. K. KLEINECKE, 8 Oliver Street, Ashburton 3147 (25 2415).

Geology: MR. T. SAULT, 9 The Avenue, West Rosebud.

Microscopical: MR. M. H. MEYER, 36 Milroy Street, East Brighton (96 3268).

Mammal Survey: MR. P. HOMAN, 40 Howard Street, Reservoir 3073

Entomology and Marine Biology: MR. J. W. H. STRONG, Legislative Council, Parliament House. Melbourne, 3002.

MEMBERSHIP

Membership of the F.N.C.V. is open to any person interested in natural history. The *Victorian Naturalist* is distributed free to all members, the club's reference and lending library is available, and other activities are indicated in reports set out in the several preceding pages of this magazine.

New Rates of Subscriptions for 1968

Ordinary Members	$7.00
Country Members	$5.00
Joint Members	$2.00
Junior Members	$2.00
Junior Members receiving **Vict. Nat.**	$4.00
Subscribers to **Vict. Nat.**	$5.00
Affiliated Societies	$7.00
Life Membership (reducing after 20 years)	$140.00

The cost of individual copies of the **Vict. Nat.** will be 45 cents.

All subscriptions should be made payable to the Field Naturalists Club of Victoria, and posted to the Subscription Secretary.

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The 1968 Wild Flower and Nature Show

Where? The Lower Melbourne Town Hall.

When? Monday, Tuesday and Wednesday, 26th, 27th and 28th August, from 10 a.m. to. 10 p.m.

This annual show is prepared and staged by the Society for Growing Australian Plants (S.G.A.P.) and the Field Naturalists Club of Victoria (F.N.C.V.).

The emphasis in the title of the former club is on the word "Growing". These enthusiasts grow native plants from all Australian States, most of them very successfully, as will be seen by a very comprehensive display. As many gardeners now indulge in this hobby, an Information Centre will be set up to answer any queries regarding the growing and availability of these plants. Despite the dry conditions of the past summer, it is hoped to have a special display of flowers from the Maranoa Gardens.

The main exhibit staged by the F.N.C.V. will feature a fern gully depicting the habitat of the lyre bird and his companions who provide him with the components of his unique songs. To complete the scene, recordings of these songs will be played at frequent intervals.

"Rushes and Sedges" provide the theme for the botanical exhibit; while the geological exhibit will feature the "Silica Group" of the minerals. The latter should interest gem collectors.

Collectors of shells and butterflies will have mounted specimens on display, and live aquatic insects will be shown in tanks. Spiders—alive, bottled and "encased" in plastic will prove of special interest.

To view the wonderful world of the minute, a number of microscopes will be set up. One exhibitor will demonstrate the method of cutting, staining and mounting plant sections for microscopical examination.

The Hawthorn Junior Field Naturalists have many interests, as shown by their varied exhibits. These will range from gem cutting and polishing to skull collecting. They will also show live frogs, lizards and snakes—in glass cases! One practical enthusiast will demonstrate an ingenious method of mounting insects in clear plastic.

Among other pamphlets which they will have for sale will be one entitled "Snakes and how to keep them".

The Preston Junior Field Naturalists Club will have an exhibit featuring "Native mammals to be found around Melbourne".

Of special interest to the young, and not-so-young, will be a selection of films on wild-life made available by the National Film Centre and others, and shown *free* at frequent intervals.

Books and publications dealing with natural history subjects may be purchased at a Publications Stand, where information relative to the F.N.C.V. may also be obtained.

At the August General Meeting rosters for helpers at the Show will be distributed. To ensure its success it is hoped that as many members as possible will attend for as many hours as possible. Those free to attend in the daytime will be specially welcome.

A great deal of assistance is necesary in helping to set up the Show on Sunday, the 25th. Work starts at 9 a.m. New members are invited to take an active part both in the setting up and during the Show.

Leaflets, window cards and car stickers will be available for distribution at the August General Meeting. With your help, we would like every school in Melbourne and the suburbs to receive a bundle of pamphlets and a showcard. Please make our Show known as widely as possible.

Admission charges: Children, 10c; Adults, 25c.

The Victorian Naturalist

Editor: G. M. Ward
Assistant Editor: P. Gahan

F.N.C.V.

Vol. 85, No. 8 8 August, 1968

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Front Cover:

No matter where one travels around the Australian coastline, the Silver Gull (*Larus novae-hollandiae*) seems always to be there. Alan Owen took this fine photograph at Broome, W.A.

Mt. Richmond National Park

By Victor Jacobs

When Wordsworth filled his vacant and pensive moods with a continuous line of daffodils, he was doing what many naturalists have done since: that is, store up a wealth of mental images for the empty days ahead while hoping that the active life will far exceed the inactive one.

A few such instances come readily to mind. One, just north of Birmingham, England, where amidst the rubble of a quarry the old watchman awaited the appearance of the Bee Orchid (*Ophrys apifera Huds.*) and informed me annually of its appearance on the rather narrow outcropping of limestone that occurred there. Another was discovering *Celmisia longiflora* with tight unopened buds on the snow line at the summit of Mt. Kosciusko in late January. Then, walking step by step up the slope noting the opening buds, the flowers, and finally, less than a dozen paces from the snow line, the ripened seeds.

The most recent instance was in a small pan or depression in Mt. Richmond National Park, where the stretch of green, unbroken except for an occasional seedling eucalypt, was cropped close by feeding wallabies, yet not close enough to have erased the liberal sprinkling of yellows and pinks. These were the flowers of miniature hawkbits, bartsia, wood-sorrel, brooklime and a tiny daisy (*Brachycome parvula*). To the casual stroller though, this quarter-acre depression was invisible. I was enticed therein by the bird activity but had no idea as I forced my way through the encircling thickets of Scented Paper-bark that they enclosed such a delightful spot.

On 7 January, 1967, we had towed our caravan the short distance from Portland to this National Park, not expecting to find many facilities and being thankful to find just that. The road from Gorae West led to the park, and a white road led us to the notice

Wet in winter—a garden in summer.

photo: Author.

A view from Mt. Richmond looking across to Discovery Bay.

photo: Author.

boards and then started to ascend. Looking for a camp site we turned on to a sand road, and a mile or so further on we stopped amidst the fine Brown Stringybarks and Messmates that are such a feature of this park.

The effect of that white road that led upward from the notice boards was obviously hypnotic. Most visitors followed what appeared to be the obvious route which had at least two advantages. It ended at the summit of Mt. Richmond and it afforded a view of Discovery Bay. Here the picnic was held and the visitors departed the way they had come, leaving the leafy side tracks for the naturalists. During our stay at the park less than half a dozen cars moved past us plus two persons on horseback returning from droving cattle.

Setting up camp took but a short time and that included erecting our portable deck tennis court. This had the double purpose of providing exercise and also being a convenient venue for hanging damp drying paper.

A short walk was fruitful of birds and plants. A flock of Goldfinches was feeding on the stringy bark of a Messmate while a hidden Rufous Whistler called powerfully. Where the bulldozers had cleared the track, two Ragworts, Austral Centaury, Bidgee Widgee, Hare's Tail Grass, Slender Mullein and Austral Bracken were colonizing it. A Kookaburra flew past and a large flock of Red Wattle-birds quarrelled in the gums. These flocks of a dozen and more were a common sight here.

After lunch we drove to the summit of the Mount and looked out on the extensive yet hardly exhilarating view of Discovery Bay. Golden Wattles were occasional and Myrtle Wattles less common. The most frequent acacia noted was the Mitchell Wattle which was flowering profusely. Spear Thistles were appearing on the road margins and a far more pleasant sight were the Feather-heads (*Ptilotus macrocephalus*) that flowered amidst the Silver Banksias.

It was that evening when, hearing the sunset activity of the birds, I pushed my way through the scrub. The slender guarding trunks of Tea Tree, then Scented Paper-bark, resisted, then allowed me to pass into the delightful pan that I mentioned earlier. Here I stood and saw one White-plumed Honeyeater, a flock of Yellow-winged Honeyeaters, a Grey Fantail and one hurrying homing starling. Would that all introduced species would hasten so agitatedly to be out of these native habitats that can

At 5.30 a.m. in Mt. Richmond National Park.

photo: Author.

manage well without them. A Currawong called and a day had ended.

Next morning my daughter Simone and I made a start at 6.20 to find a cool, windless morning. It was clear except for a narrow belt of mist that hung about eight feet above ground level.

By seven o'clock we had made our way, with many pauses, to the track that marks the southern boundary of the park, recording as we went, Red Wattle-birds, Yellow-winged Honeyeaters, Brown Thornbills, Grey Thrushes, Magpies, Crimson Rosellas, Blue Wrens, Kookaburras, Sulphur-Crested Cockatoos, Spur-winged Plovers, Scarlet Robins, Grey-backed Silvereyes, Goldfinches, Yellow Robins, Yellow-tailed Pardalotes, Skylarks and a blue winged parrot.

On this southern sandy track there were hundreds of marks made by the wallabies which, by the appearance of the tail and feet spoors, had been made by diagonal leaps when the animals had returned from their nocturnal feeding outside. We saw a couple of the young ones and heard others crashing through the scrub.

Two Black-faced Cuckoo Shrikes flew swiftly coastwards where a couple of eagles were soaring above the sea. Hungrily we headed for base camp; rather more quickly than the outward walk, but still able to note most of the birds we saw on that stretch.

Taking a short cut on this return we came across a small quarry from which rock had been taken to form the road to the summit. The upper layer is a sandy coloured granular material that crumbles easily with finger pressure to a coarse sand. The lower layer is a creamy white rock which also crumbles with a slightly heavier finger pressure to a fine smooth white powder. Both these rocks, because of their contrast to the black surface sand, posed a question. After breakfast I lost a challenge match at deck tennis and, sitting ruefully looking at my black feet, believed that I had solved the puzzle of the contrasting sand and the underlying rock. The black colour of the sand is an additive subscribed by many years of bushfires, which is the reason for its coming free of the sand so easily.

All that day around the camp area a loud "Chip choo chooee" had intrigued me but its caller had eluded my vision. A dozen times I had tracked after it but it hugged the ground so closely that I didn't have a glimpse. Trying again I went into the pan and had moved halfway across when the bird popped up in clear view, apparently as eager to see me this time as I was to see it. It was a Rufous

Bristle-bird. My first sighting of that species.

Next day, as dawn lit the sky, I listened to the booming of the surf which sounded much closer than its three miles. The morning was similar to the previous one, even to the mist of haze that dispersed equally rapidly. Just outside the camp I noted a flock of White-naped Honeyeaters and a solitary White-throated Tree Creeper. Along the northern track I came across a few gums with their new bark of a delicate salmon shade. They were identified as *Eucalyptus vitrea.* Here too was Prickly Geebung. A Brown Goshawk left the ground and stared unblinking from a perch a few yards distant.

Until quite recently the park fence must have had similar vegetation on either side, but now the natural vegetation stops abruptly as if sliced by the wires, while outside the uprooted trees and ploughed ground show that the divorce is absolute and the encroachments of progress have swiftly swooped upon the unprotected areas.

Regretfully we bade adieu to delightful Mount Richmond National Park.

Plants Recorded

A. In the low lying pan		
Scirpus nodosus	Knotted Club Rush	f.
Oxalis corniculata	Yellow Wood-sorrel	a.
Gratiola peruviana	Brooklime	a.
Mazus pumilio	Swamp Mazus	a.
Parentucellia viscosa	Sticky Bartsia	a.
Leontodon nudicaulis sp.	Hawkbit	a.
Brachycome parvula	Small Daisy	a.
B. In the scrub		
Pteridium esculentum	Austral Bracken	a.
Persoonia juniperina	Prickly Geebung	r.
Banksia marginata	Silver Banksia	f.
Exocarpos strictus	Pale-fruit Ballart	r.
Muehlenbeckia adpressa	Climbing Lignum	f.
Ptilotus macrocephalus	Feather-heads	o.
Stellaria pungens	Prickly Starwort	f.
Acacia longifolia	Sallow Acacia	l.a.
Acacia mitchellii	Mitchell Wattle	f.
Acacia myrtifolia	Myrtle Wattle	r.
Acacia verticillata	Prickly Moses	o.
Pelargonium australe	Austral Storksbill	f.
Correa reflexa	Correa	f.
Pomaderris ssp.	Dusty Miller	f.
Hibertia fasciculata	Bundled Guinea-flower	f.
Eucalyptus vitrea	White-top Gum	o.
Eucalyptus baxteri	Brown Stringybark	a.
Eucalyptus obliqua	Messmate	a.
Leptospermum juniperinum	Tea Tree	a.
Leucopogon parviflorus	Coast Beard Heath	o.
Leucopogon lanceolatus	Lance Beard Heath	o.
Melaleuca squarrosa	Scented Paper-bark	l.a.
Goodenia geniculata	Bent Goodenia	f.
Senecio hispidulus	Fireweed	f.
Senecio lautus	Variable Groundsel	f.
Senecio odoratus	Scented Groundsel	f.
Sonchus asper	Rough Sow Thistle	o.
Ixodia achilleoides	Ixodia	f.
Helichrysum blandowskianum	Woolly Everlasting	f.

a = abundant. f = frequent. la = less abundant. o = occasional. r = rare.

Gold on the Bough

by W. PERRY

Today, the Whipstick is almost silent. The swish of gravel in the miners' cradles, the monotonous tramp of horses' feet circling the puddling machines hours on end, the creak of windlass and the muffled explosions of underground blasting of quartz reefs—all these once familiar sounds are heard no more. Probably they will never be heard again in the Whipstick. However, although the golden metal is now seldom seen, "Nature" is unstinting with her gold on the bough. As they did long, long before the miners came, so now, after the great treasure hunt is over, the Whipstick wattles dust with gold the scrub-covered hills and gullies most months of the year.

Fourteen species of acacia (acacias are more popularly known as wattles) occur in the Whipstick. Some almost hug the hungry soil, but most are large shrubs or tall trees. No species with compound leaves (like the Cootamundra Wattle) are native to the Whipstick; all bear phyllodes.

In the heat of summer, during the last weeks of January and early into February, *Acacia difformis* (known locally as the Mystery Wattle) flowers. For years, botanists searched in vain for pods of this wattle. The fruits were necessary for identification, and lacking them, the identity of this species remained a mystery for many years. Eventually research was undertaken at the National Herbarium, Melbourne, where it was identified. The Mystery Wattle is unusual in that it multiplies freely by suckers. This was proved with pick and shovel when roots connecting a number of small trees were uncovered. It grows in dense thickets, sometimes covering several square chains, usually along creek flats or low ground subject to winter flooding. Frequently it attains the dignity of a small tree, and specimens from eighteen to twenty feet are not uncommon. The yellow blossoms are borne in bunches like the Golden Wattle, but the heads are smaller and less fluffy. The phyllodes are usually sickle-shaped, sometimes over five inches long and half an inch wide. The ends of the branchlets are flattened.

The Spreading Wattle (*A. diffusa*) is common throughout the Whipstick, and may be found in flower for five months of the year, from April to August. Sometimes five or six feet high, this prickly wattle has narrow, quadrangular phyllodes usually over an inch long, with pungent points. Each pale cream flowerhead is borne on a stem about as long as the phyllodes, with usually two flowerheads together in the axils (the angle formed between phyllode and stem).

During the cold, wet days of winter, a small area of some four square miles of dense bush in the very heart of the Whipstick is aglow with the beauty of a rare wattle, the Bent-leaf Wattle (*A. flexifolia*). This wattle also occurs in New South Wales and Queensland, but in Victoria, apart from the Whipstick, it is known only from Wychitella, Earlston, Shepparton, Rushworth State Forest, and Reef Hill near Benalla. In the Whipstick it is a small shrub seldom over four feet high with narrow, short phyllodes, usually less

than a half-inch in length. It is easily identified by the phyllodes. The mid-vein, instead of being central as is usual with most species of wattle, is very close to one edge causing it to appear much thickened. In the past this wattle was incorrectly recorded as *A. lineata* for the Whipstick.

A rather uncommon wattle found mainly on stony hills is the Ploughshare Wattle (*A. gunnii*). The plants are low, straggling shrubs seldom over two feet high. The sharp-pointed, stemless phyllodes are distinctively shaped like ploughshares, and are seldom more than a quarter of an inch long. The pale yellow blossoms occur singly in the axils, with the stems always longer than phyllodes. The Ploughshare Wattle flowers from June to September, and is confined to the western and central areas of the Whipstick. Previously, this wattle was known as *A. vomeriformis*.

Golden Wattle (*A. pycnantha*) is found throughout the Whipstick, flowering from June to September. The large golden flower-heads may consist of over eighty separate flowers and are borne in bunches. The phyllodes are usually long and broad. This wattle ranges in size from shrubs to small trees of over twenty feet in height. Although growing freely on the hills, its greatest show is along the alluvial flats and gullies. A drive along Neilborough Road or through Scotchman's Gully towards the end of August is an exhilarating experience not soon forgotten. Here, where it is abundant among the old alluvial mine workings, the golden masses of this wattle, interspersed with the white trunks of Yellow Gums and the black, deeply-furrowed trunks of Ironbark, blend their colours on a grand scale which no artist but Nature could achieve.

The show-piece of the Whipstick however, is the Hakea Wattle which occurs in two forms. At the southern end of the Whipstick the keen observer may find small trees of this species, *A. hakeoides*. The phyllodes are some three-eighths of an inch wide and up to four inches long, while the blossoms are borne in small bunches, often as long as the phyllodes. This species could be confused with some forms of Golden Wattle, but the pods of Hakea Wattle are easily distinguished from those of the former. The tree-like *A. hakeoides* is rare in the Whipstick.

Most abundant and widespread of all Whipstick acacias is the Whirrakee Wattle (*A. hakeoides* var *angustifolia*). It occurs as a rather dense shrub, frequently over ten feet high. The phyllodes may measure three inches or longer, but are seldom wider than

An example of the Whirrakee Wattle (*Acacia hakeoides* var. *angustifolia*).

photo: Author.

three-sixteenths of an inch. The flowers are borne in bunches which are shorter than the phyllodes. The Hakea Wattle blooms during August and September, and from mid-August to mid-September is the time to see this wattle at its best. A drive through any track in the Whipstick then is one of never ending beauty. Excellent viewpoints are along the Tennyson Road between Huntly and Kamarooka, and the Neilborough Road between Simpson's Road, Eaglehawk, and Neilborough. At North Huntly are several large paddocks known as the Hakea Paddocks. Here, the Whirrakee Wattles free from the competition of other vegetation have grown into huge dome-shaped shrubs with foliage sweeping the ground. Some measure over twelve feet across and six to eight feet high, presenting a magnificent spectacle when in bloom.

Towards the end of August when the Hakea, Whirrakee and Golden Wattles are blooming, the Whipstick glows with embers of living gold.

A yellow-flowered dwarf wattle most prevalent in the western and central areas of the Whipstick is the Rough Wattle (*A. aspera*). It is usually a compact dome-shaped shrub seldom over two foot six inches high. The phyllodes and branchlets are covered with short gland-tipped hairs which make them rough to the touch, hence the name, Rough Wattle. The phyllodes may be an inch long to one-eighth of an inch wide, and are deeply furrowed underneath. The bright yellow heads occur two together in the axils, on stems which are shorter than the phyllodes. This wattle flowers during August and September and may be found along the Neilborough Road between Simpson's Road, Eaglehawk, and Flagstaff Hill.

Two dwarf wattles which bear close resemblance are Gold-dust Wattle and Spoon Wattle.

Gold-dust Wattle (*A. acinacea*) is common throughout the Whipstick. On the hard stony hills this wattle seldom exceeds eighteen inches in height, but in the gullies and on the better soil of the alluvial flats, large shrubs frequently over six feet in height occur. This wattle is a glabrous plant with much variation in size and shape of the phyllodes on different plants. Often the phyllodes are up to half an inch long and three-sixteenths of an inch wide. Whatever the size and shape, each ends in a minute bent tip, giving the end of the phyllode a lop-sided appearance. The flowers occur either singly or in pairs from the axils on stems usually longer than the phyllodes. Perhaps the most beautiful sight in the Whipstick is a shrub of Gold-dust Wattle with the sunlight glinting from countless golden blossoms as the slender branches sway gently in the wind. This acacia, daintiest of the Whipstick wattles, flowers during August and September.

Seldom taller than three feet, the Spoon Wattle (*A. rotundifolia*) is found mostly in the central and northern Whipstick. The phyllodes are almost circular, only occasionally more than quarter of an inch across, hence the name, *A. rotundifolia*. The bright yellow blossoms occur singly or in pairs from the axils on stems longer than the phyllodes. These are more crowded along the branches than those of Gold-dust Wattle. The Spoon Wattle flowers during August and September and is to be found along the Huntly-Tennyson Road, especially near the Kamarooka Forest. This wattle was previously known as *A. obliqua*.

Although widespread in the Whipstick, shrubs of the Mallee Wattle (*A. montana*) are most numerous in the central and northern areas. It thrives in gullies and flats, particularly so on ground subject to winter-flooding. When competing with other vegetation

this wattle is often tall and spindly, sometimes ten feet high, but on open ground the foliage may reach the ground, resulting in a dense dome-shaped shrub. Near Neilborough, shrubs of this type are sometimes over twelve feet across. The yellow blossoms occur in pairs of axillary stems which are shorter than the phyllodes. These may be up to one and a half inches long and a quarter of an inch wide. In addition to the mid-vein, another prominent longitudinal vein runs almost parallel to the mid-vein. This character aids identification. On the tips of the branchlets the foliage often appears as though varnished. No other Whipstick wattle has foliage like this. Because of previous mis-identification, this wattle has in the past been erroneously recorded as *A. sclerophylla.*

Hedge Wattle (*A. armata*) is not plentiful and is found on the southern fringe of the Whipstick, along and near the Eaglehawk Creek. It flowers during September and October. The stemless phyllodes are about five-eighths of an inch long and a quarter of an inch wide, ending in a minute pungent point, while at the base of each phyllode is a pair of needle-like spines. The dark yellow blossoms, borne singly or several together in the axils, have stems longer than the phyllodes. This wattle is the only Victorian species not protected by law.

Extending through the centre and across the northern end of the Whipstick, the Grey Mulga (*A. brachybotrya*) prefers good soil. Usually, it is a dense spreading shrub frequently over eight feet high and flowers during September and October. The phyllodes are oval, sometimes an inch long and three-quarters wide, while the branchlets bear numerous short hairs. The flowers are mostly axillary, singly or several together on hairy stems which are sometimes shorter or longer than the phyllodes. A characteristic of Grey Mulga is that at flowering time, immature fruits of the previous season are often present.

Found mostly along the gullies on the western fringe, Ausfeld's Wattle (*A. ausfeldii*) flowers during August and September. This graceful shrub is sometimes twelve feet high. The phyllodes are almost covered with glandular dots, and measure up to one and a half inches long and a quarter of an inch wide. The bright yellow blossoms are axillary, one or several together on stems shorter than the phyllodes. The best localities for this wattle are near the Moon Mines, close to Sailor's Gully, and at Scotchman's Gully. In past records of Whipstick flora, *A. ausfeldii* was mistaken for *A. leprosa.*

In the National Herbarium, Melbourne, are mounted specimens of Umbrella Wattle (*A. oswaldii*) collected some years ago by Mr. A. B. Court from a moribund tree in the Whipstick near Kamarooka. Only one tree of this species was observed, and if still alive, must be regarded as the rarest wattle in the Whipstick.

In the last eighteen months concern has been felt that some of the remaining Whipstick Crown Land may be sold for clearing. Strong protests have been made and it is hoped that all remaining Crown Land will be retained and left in its natural state. For the wattles alone, this area is worthy of protection for all time.

Acknowledgement is made to the staff of the National Herbarium, Melbourne, and especially to Mr. A. B. Court for assistance in the identification of Whipstick flora.

Readers' Nature Notes and Queries

Observations from Albert Park Beach

These notes plus a request for help come from Mrs. J. W. Stevens of Brunswick in Victoria.*

Albert Park Beach is a central and easily-accessible spot for the study and observation of Marine Biology.

Last March I was able to collect two jars of living specimens and a trayload of shells for home study.

There were about 14 different varieties of seaweed of the smaller species (from 2″ to 6″ in length), ranging in colour through red, green, brown and black. Some appeared to be in flower or spore.

There were about six varieties of Sea Anemone, varying in size from less than ½ an inch across to about 3½ inches across. Some were with tentacles, long or short, red or green; some had none, with bodies of red or grey. Some were heavily disguised with pieces of broken shell. Some were attached to rocks in pools, and some to larger shells. Others were buried deep in wet sand, and attempts to examine them resulted in their burrowing deeper. One small one was disguised among some acorn limpets. which had discoloured to the same greenish-grey colour.

Two kinds of crabs were observed—a transparent pink one about 1½ inches in length, scuttling among the rocks; and a ½ inch greenish one which moved much faster. Remains of larger shells on the beach suggested the presence of more species than I observed.

Mussels were plentiful, and colonies of baby ones were on the rocks at the water's edge. Some were attached to the back of large mussels. and hidden by seaweed growths and shells.

Cockles and other shells were in good supply, but were old and probably not growing there. A collection of large scallop shells was brought home to be cleaned and polished. A lot of iron in the water had coloured all of them.

There was quite a large colony of small (½ inch) greenish-striped, transparent winged scallops? Some were collected and are still alive.

There were also river stones, and interesting pieces of old iron with shells embedded.

Birds fairly numerous included silver gulls, bronze-winged pigeons, and one large gull with black wings and a hook on the end of its beak.

The seaweeds in particular, were very beautiful; some looking like miniature full-grown eucalypts under the hand glass.

Help from any member to collect, mount and classify a collection of Australian seaweeds, would be greatly appreciated. My ignorance is apparent, and I do not speak or read foreign tongues.

* 297 Albert Street, Brunswick, Vic.

Notes on Ant Colony

This note comes from Mr. K. C. Rogers of Wulgulmerang in Victoria.

The Little River flows through our paddocks at Black Mountain, which is on a tableland forty miles north of Buchan. The altitude is about 2900 feet.

On the 16th of March this year I was walking on a gravelly slope along the top of a low cliff that overlooks the river, when I noticed what appeared at first glance to be a crack in the ground. A closer inspection revealed it was an ant corridor, made just under the surface of the ground. Its total length was 35 feet, but for a distance of 21 feet the roof had fallen in, showing the stream of ants passing to and fro. Then for 10 feet the tunnel was still intact, whilst the remaining 4 feet was an open track, polished with use. Here the ants crossed a patch of very hard ground leading to their nest in the roots of a fairly large snow gum tree. Around the roots of the tree, and lower parts of the trunk, was an accumulation of old grass seeds and bits of dead grass, up to an inch or more in length.

Another line of ants went up the tree, where there was evidently a food supply, but what the tunnel users were after could not be ascertained. The lower end of the line just disappeared into the rocky ground only a dozen yards from the dry bed of the river.

These ants were about one eighth of an inch long and a very dark brown. Conditions at the time they were first noticed were extremely dry, probably causing the partial collapse of their tunnel. The remainder of the tunnel lasted till the rain came in May.

Whipstick Nature-trail

by F. Robbins

With the publishing of this article, the possibility arises of similar ones being written to cover various parts of Victoria and other States. Any reader who wishes to contribute such material, may write to the editor for details.

Hakea wattle, which grows in Bendigo's Whipstick area, provides a glorious show which is repeated from year to year during the last week in August and the first week in September. The regularity of its blooming has become widely known and has increased in popularity for both locals, and the many who travel long distances.

It is with this in mind that the Bendigo Field Naturalists have prepared a route map, with speedometer readings (which is reproduced herewith), so that all who wish to enjoy this nature drive may do so at their leisure, and so obviate the discomfort of dust when travelling in a guided party.

The round trip is about 31 miles; and you may start at the fountain, or if you wish to reverse the procedure, start at Eaglehawk Town Hall, in which case you will have to calculate your own mileages.

Beginning at the Fountain, you reach the Huntly Shire Hall at 7.8 miles. Taking note of this reading, follow bitumen to the bridge over Bendigo Creek at 9.7 miles, and shallow ford at 10.8 miles, after which gravel road begins.

The Hakea wattle starts at about 11.2 miles on the right—a paddock full of it. It will be recognized by the nicely rounded symmetrical bushes, anything from 4ft. to 12ft. high, with grey-green narrow leaves, and completely covered with golden bloom.

Turn left at the signpost to Neilborough (11.5), and again the Hakea wattle is in the paddock on the right (12.00). Turn right at 12.60. The State Forest will now be on your left. Out in the paddock on the right, there is a large patch of Peach Heath (*Lissanthe strigosa*) and usually White Fronted Chats will have nests here in Spring. Also look for Blue Caladenia (*C. coerula*), Swan Greenhood (*Pterostylis cycnocephala*) and the introduced irid—*Galaxia fugacissima* (a yellow flower—lasts a few minutes if you pick it—and it is the last entry in J. H. Willis' *Plants in Victoria* not reported in Australia until we found it in 1955—now becoming widespread). In the forest on your left you may see the white flowers of the slender Daisy-bush (*Olearia tereti-folia*).

Watch out for a *graded track* into the forest at 13.4.

You will now traverse a beautiful forest of eucalypts (mostly grey box and yellow gums), with Hakea Wattle, Golden Wattle and other typical Bendigo plants.

A eucalyptus factory which may be operating comes on the right at 15.3. Here, blue and green mallee leaves are distilled to make eucalyptus. Do not interfere with anything if you inspect it.

The ford at 15.6 is never without water, but is perfectly safe if you keep to the left of it. Be sure to turn right where the fence stops at 15.80, then go straight ahead on the less travelled road.

Whipstick

Just a little past 16.00, where the map shows a track to the left, you may see a very unusual variety of Rosemary Grevillea (*G. rosmarinifolia*) very close to the track on your right. DO NOT PICK—there are only a few of this pale green flowered Whipstick plant.

Soon you come upon the real Whipstick at 16.10—first Bull Mallee (*Eucalyptus behriana*) with round leaves, then later the Blue Mallee (*E. fruticetorum*) with blue leaves (at least on the young branches), and Green Mallee (*E. viridis*) with narrow green leaves. You will see areas where the mallee has been cut for distillation of eucalyptus oi. Here are the good wildflower areas. At about 16.50 you come to a dam (Skylark Gully runs across here). More rare Rosemary Grevillea appears here; and also Club-leaf Phebalium (*P. obcordatum*), the blue Rough Mint-bush (*Prostanthera denticulata*), and if you have time, there is a very rare *Prostanthera saxicola* var. *bracteolata*. To find it, you would have to follow the rough track down the Gully, and to the left for a quarter mile or so. There is also quite a deal of small Crowea (*C. exalata*). The former flowers in November, and the latter from August until October.

At 17.70 you reach the crest of the rise covered with white quartz stones. If you stop here, you can walk about 300 yards south to the fenced-in Flagstaff Reservation. Here *Phebalium obcordatum* is on show from September to October; with many other Whipstick plants. Oval-leaf Psuedanthus (*P. ovalifolius*) abounds with its tiny white flowers. (I have tried to introduce other Whipstick plants here with little success, owing to dry seasons and remoteness.)

There is a track running north, which would take you to our only patch of Slender Velvet Bush (*Lasiopetalum baueri*), about half a mile away. Do not try to find it unless you have plenty of time, it is along a gully running down from further west.

Just before crossing the Sebastian Water Race at 18.40, you find more *Phebalium obcordatum* beside the road. You then meet the main Neilborough road at 18.80 and the old hotel with its old lamp at 19.000. Go straight ahead.

Very soon you are again in Mallee country with abundant Hakea Wattle. At 21.70 the road to the right leads back to Eaglehawk, but you may see the remains of Magetti's old wine hall 140 yards or so upon the left. Here in the summer evenings 100 years ago you could drink wine and play Italian bowls on the green in front of the wine hall. Nothing remains now except the cellar, and a pepper tree to show where men once swarmed in the cool of the evening, and become involved in a fight for less than the asking.

A few more rare Rosemary Grevilleas grow here (if you know just where to look beside the road).

At 24.60 you will reach the Rifle Range, which has a wonderful show of wildflowers in the Spring. A little further on at 24.90 there is a signpost directing you to Lightning Hill Lookout, a few hundred yards up the rise.

View

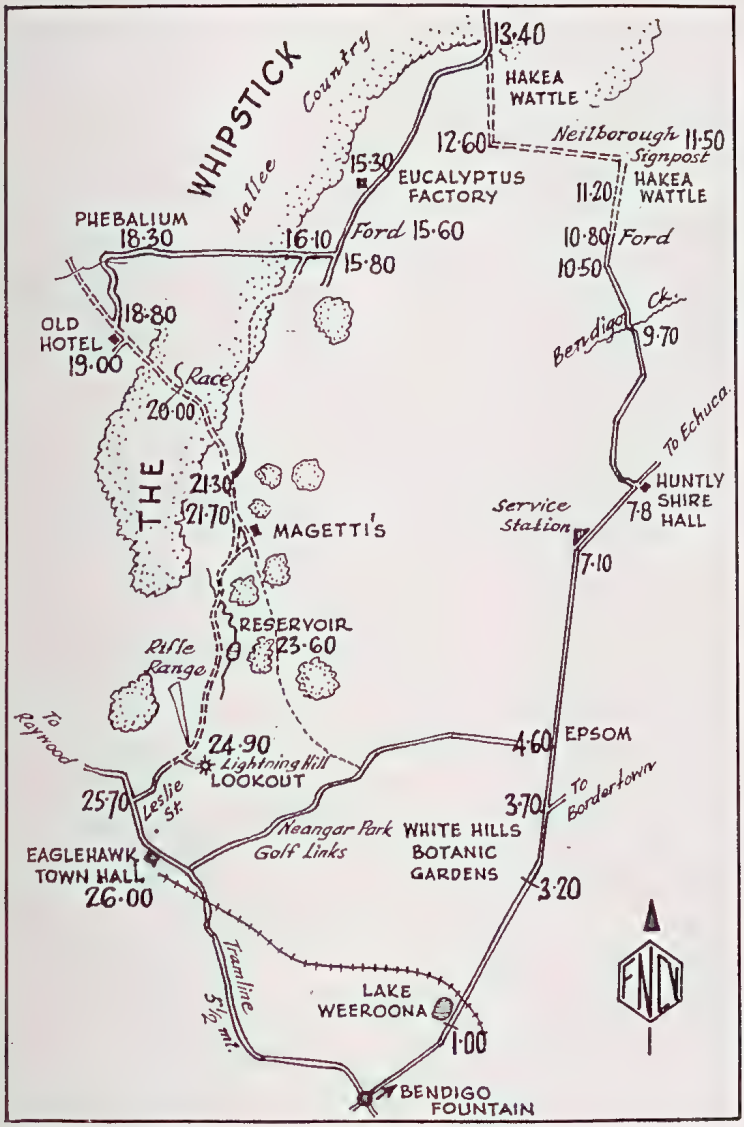
From here a wonderful view of Bendigo and the Whipstick Forest is obtained. Follow the bitumen, and at Leslie St. (25.70) the main Raywood

road is met, followed by the Eaglehawk Town Hall at 26.00. Five and a half miles further along the tramline brings you back to the Fountain, a total of about 31 miles.

The alternative road at Maggetti's will bring you back to the Neangar Park Golf Links bitumen road, or if you wish, the bitumen road to Epsom.

It depends on the season, but usually 31 August, is the best date with one week either way.

It does not last long. We don't know of any other place where there is such a massed display of this wattle.



The mileages shown are additive, and a note should be made of odometer reading before starting from the fountain.

Map is not to scale.

Fungal Excursion to Sherbrooke Forest

Fungal forays by the Club were once almost an annual event during late autumn; but many years had elapsed since Sherbrooke was the venue for such an outing. The 40 or so members who assembled, from bus and private car, at the attractive picnic spot under pines on Sunday, June 16th last, were indicative of a perennial interest in this fascinating section of the botanic realm. The warmish misty morning was just right for a winter circuit of the region between Marybrooke Lodge and Sherbrooke Falls, but unfortunately fungi were neither so varied nor numerous as one might have expected after such recent good rains over the Dandenongs. Lyrebirds also, despite their tell-tale scratchings, remained unseen and unheard.

Some 260 species of higher fungi have been noted from time to time in this piece of tall mountain forest; but our excursion party succeeded in finding only about 70 of them, many kinds being in quite short supply. Perhaps we were a trifle too late for the optimum burst of fungal activity earlier in May? By far the most well-represented genus everywhere, on tree-trunks, fallen branches and sticks, was *Mycena* and at least ten species of these tiny, delicate, elfish toadstools were noted—from the ever-popular little blue "Pixie's Parasol" (*M. interrupta*) to extensive troops of rosy-lilac *M. rosella* all along a mossy log. Grey-brown *M. subgalericulata* was extremely plentiful on the boles of *Eucalyptus regnans*. Abundant, too, were dense clusters of an unidentified *Hypholoma*—perhaps the European *H. epixanthum*, resembling *H. fasciculare* ("Sulphur-top") but with pale yellow caps and creamy-yellow (*not* greenish) gills. The beautiful olive-green *Cortinarius austro-venetus* (dry satiny caps 1-3 ins. wide and young gills golden) was much admired, as were more occasional specimens of the slimy-topped, purple *C. subarcheri*. Cup-fungi did not appear conspicuous, but a few good examples of yellow *Calycella citrina*, white *Helotium gratum* and microscopic white-woolly *Dasyscypha pteridophylla* were found on woody debris, the last being peculiar to dead fern rhachises. The only coral-fungus of note was wood-inhabiting *Clavicorona pyxidata* (pale pinkish-cinnamon) and those who doubted its hot peppery taste were soon disillusioned by nibbling a fragment!

The sun emerged at lunch-time, and thereafter our party drove off to Emerald Lake, via Monbulk and the attractive Fairy Dell road along Sassafras Creek. In light forest around Monbulk are many patches of a large-leaved, spring-flowering "hickory wattle" that was described only a few weeks ago under the name *Acacia obliquinervia* M. D. Tindale—it has previously been confused with *A. falciformis* DC., a taller later-blooming tree of East Gippsland. Apart from some excellent, large samples of *Cordyceps gunnii* (Victoria's commonest "vegetable caterpillar") under Silver Wattles on hillslopes along the entrance road, Emerald Lake reserve proved to be a disappointment mycologically. The chestnut grove, which

at this time of year normally yields an exciting crop of gaudy orange-to-scarlet Fly Agarics (*Amanita muscaria*) was quite bare—except for its russet carpet of fallen leaves. Only two battered specimens of this handsome introduced but poisonous toadstool were located, after an hour's searching. Nor did the nearby pines yield more than a odd miserable example of those two other introductions, *Lactarius deliciosus* and *Boletus luteus* —both edible. In a thicket of leafless poplars farther up the gully-head, we were somewhat compensated by a massed display of bracket-forming, wood-destroying Rainbow Fungus (*Polystictus versicolor,* which has had quite a checkered nomenclatural career) and some good occurrences of *Irpex brevis,* with many overlapping, small, creamy brackets and a pore-surface torn into innumerable tiny flattened teeth. The day's fungal observations concluded with a colony of rather old, weather-beaten "earth-stars" (*Geastrum hygrometricum*), in loose litter beside a hebe hedge; this leathery species is strongly hygroscopic, its rays opening and closing as conditions become damp or dry—from this peculiarity it has been called "poor man's weather-glass" in Britain.

With reference to another kind of "litter", we were simply appalled at the untidiness all around the precincts of the Lake Reserve: waste paper, bottles, beer cans and tins of every description liberally strewed over the picnic areas, in the little creek and up among the plantations of unusual and lovely trees. If the week-ending Australian persists in being *so* careless and slum-minded, cannot something be done to police more effectively an area of such sylvan beauty and charm as Emerald Lake?

—J. H. WILLIS (Leader)

Errata

On page 182 of *Vic. Nat.* for July 1968, an unfortunate error occurred in the caption relating to the species of the eucalypts shown. The caption should read—"Pictured above are two West Australian Eucalypts, the upper one of which is in flower at present in Melbourne. Above—*Euc. caesia.* Below—*Euc. erythrocorys.*

F.N.V.C. Publications Available for Purchase

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Address orders and inquiries to Sales Officer, F.N.C.V., National Herbarium, South Yarra, Victoria.

Payments should include postage (4c on single copy).

Book Review

Plants of Prey in Australia

by Rica Erickson

(Lamb Paterson Pty. Ltd., Perth, W.A. 8½" x 5½". 94 pages. 19 plates, 10 in colour. Price $4.50.)

There is no more fascinating study in botany than the dependence of certain plants upon insects, either for pollination or for food. This relationship so captivated Mrs. Rica Erickson, formerly of Bolgart (W.A.), that she made a detailed study of the orchids in her State and of the triggerplants throughout Australia—both taxonomically, and biologically according to their observed insect pollinators. The most intriguing adaptations were revealed, some of them for the first time. Fortunately for natural science Mrs. Erickson, who is also a talented writer and artist, brought together the results of these interesting researches in book form: *Orchids of the West* appeared in 1951 and *Triggerplants* in 1958, both published by Paterson Brokensha Pty. Ltd. The two monographs are enhanced by numerous color plates from her lucid paintings, and have enjoyed great popularity among naturalists. During the past decade Rica Erickson has been absorbed in the equally fascinating carnivorous plants of the continent—the many sundews, bladderforts and more localized pitcher-plants which commonly inhabit boggy places and contrive to supplement their diet by capturing small creatures from the surrounding air or water.

Plants of Prey in Australia, which came off the press in April 1968, now forms a worth trilogy with its two predecessors and follows closely the format set in *Triggerplants*. Excellent descriptions are provided for 102 species, more than half belonging to the sundew genus *Drosera* in which Western Australia is so astonishingly rich. The complete geographical range of each taxon is cited, together with notes on its habitat, while very few of the items lack illustration (either black-and-white drawings or water-colour reproductions); special attention is devoted to the critical details of stipules and styles in *Drosera* and minute submerged bladders in *Utricularia.* Simple workable keys are provided to the numerous species in each of these two large genera, and the inquirer is equipped, as never before, to identify any member that may be encountered in the field.

Mrs. Erickson has been ruthless with the nomenclature of the Tropical Pitcher Plant (*Nepenthes mirabilis*) and has swept into the circumscription of a single species all ten so-called "species" that were recognized for North Queensland by F. M. Bailey; these she regards as "mere growth forms". Incidentally, a very pleasing feature is the reproduction in colour of two *Nepenthes mirabilis* portraits by the late flower-painter, Mrs. Ellis Rowan, by permission of the National Library at Canberra. A fellow scientist has described *Plants of Prey* as "a most elegant production"; and so it is, well meriting a place on any botanical bookshelf.

The reviewer has been taxed to find a single error or misprint, but he did spot *"E. dunstanii* instead of *U. dunstanii* for the Thread-flower Bladderwort on page 84. A little more care could have been given to the uniform abbreviation of literary references, e.g. on p. 31 the rendering of "Pl." for *Plantarum* is capitalized in No. 25 *D. spathulata,* but appears in lower case against No. 26 *D. stolonifera.* Similarly the French periodical is

shortened to *Ann.sc.nat.* after No. 23 *D. zonaria* on p. 30, but becomes *Ann.Sc.nat.* with No. 29 *D. planchonii* on p. 34. Another disturbing matter is the non-sequential appearance of plate numbers; for instance, Plate 13 occupies p. 51, followed by colour-plates 12 and 14 together, but the next plate jumps to No. 17 on p. 63 —all somewhat confusing! But, at least, a "List of Illustrations" gives their correct pagination on p. (9). Such minor flaws do not in the least affect the scientific value and usefulness of this delightful work, and high praise is extended to the painstaking author as well as her publisher, Lamb Paterson Pty. Ltd.

—J. H. WILLIS.

Young Naturalists of Pascoe Vale

Recently, Mr. Ros Garnet told me of four young boys who had stopped outside his home in Pascoe Vale while he was busy in the garden. His interest was aroused when he overheard the boys naming the native plants; and consequently he became aware of the existence of a Young Naturalists Club in Pascoe Vale.

I eventually wrote to the Secretary, and received this wonderful reply—

Dear Sir—On behalf of our Club I would like to thank you for taking the time and trouble to write to us. We appreciate this very much.

The Club, which was started about 2½ years ago by my brother Lex and myself, now has 11 members and we expect to have more soon.

Our aims are encouraging interest in wildlife, promotion of native plants, conservation of wildlife and beautification of Pascoe Vale and surrounding districts.

We hold meetings usually fortnightly, at my home, and make excursions about twice each year. We hand-produce a small annual magazine using the Eastern Spinebill as our symbol.

To encourage Honeyeaters we grow and distribute native plants to local householders, and are presently discussing with the Coburg Council the planting of natives as street trees and in parks.

Recently we collected $3.50 for the Helmeted Honeyeaters at Yellingbo.

I produced an illustrated list of the local bird varieties (over 50 in all) for the Pascoe Vale North State School and have given lecturettes on conservation there and at Essendon Grammar School.

Thank you for your offer to include a small article in the *Victorian Naturalist*. The Club members would be very grateful if this can be arranged.—Yours sincerely,

KELVIN THOMSON,

106 Derby Street, Pascoe Vale South. 3044.

Surely here is a group of youngsters that deserves our utmost encouragement and help; and we look forward to hearing about their future work. [Ed.]

Errata

In the *Vict. Nat.* for June last (**85,** 6), two minor errors appeared in the report of the F.N.C.V. Excursion to Broken Hill. "Sunraysia Naturalists' Research Trust" is the name of the particular organization; and the Museum of Local History was the home of Mr. W. B. Chaffey, not the Chaffey Brothers.

Hawthorn Junior Field Naturalists Club, 1943-1968

by B. J. Cooper

This month, August 1968, Hawthorn Juniors will celebrate their twenty-fifth anniversary. As this Club was founded, and is still principally administered by F.N.C.V. members, it seems an appropriate time to recall all those who have assisted in this group over the years, as its activities have been rarely recorded in this magazine.

Why was the Club formed?

The F.N.C.V. has tried to provide adequate facilities for children interested in Natural History since its early days. As recently as 1883 provision was made for Junior Membership at 5/- per annum. However, the move met with little success.

In 1904 a determined effort was made to increase Junior membership. Subscriptions for Juniors (under 18 years) were cut to 1/- per annum, and monthly excursions were organized particularly for Juniors. Separate meetings were sometimes held and approaches were made to Youth Organizations. The result was that by May 1905, the F.N.C.V. had a total of 325 members, 120 of whom were under the age of 21 years. Of these, the majority were under 18 years of age. This system was successful for many years. However, the practice gradually lost favour and was discontinued by 1914.

The above information gives some background to the proposal to form separate Junior branches, rather than cultivate interest inside the F.N.C.V. itself, which occurred in the 1940's.

Formation of a Junior Club.

At the meeting of the F.N.C.V. committee on 28/10/41, a special sub-committee was formed to consider the formation of Junior and Country Branches. The members of this sub-committee were — Messrs. P. C. Morrison, L. W. Cooper, F. S. Colliver and Noel Lothian. Following a meeting on 10/11/41 it made the following recommendations in reference to Junior Branches:—

> "As it is considered inadvisable to form more than one branch at present it is decided that a trial Branch be formed in the eastern suburbs. The meeting place of this Branch will be the Hawthorn Town Hall. One of the main aims of these branches will be to emphasize to the Juniors the advantage of attending ordinary Club meetings in addition to their own meeting."

These were adopted at the following committee meeting.

Mr. S. R. Mitchell was given full power to approach the authorities at Hawthorn and make whatever arrangements he thought necessary in establishing a Junior club. Correspondence ensued between Mr. Mitchell and the Hawthorn City Council, and approval of the scheme was was given in June 1942.

The F.N.C.V. first contacted the Council authorities through Councillor Fowler of the Library Committee. This association with the Library still lasts today, enabled a Nature Show to be staged in the Hawthorn Library during November and December 1942.

This show was to gauge interest in the proposed society. The young people of the district were invited to attend, and a book was made available in which children interested in a Junior Naturalist Club, could sign their names and addresses. The arrangement of the show was again the work of Mr. S. R. Mitchell. He was ably assisted by Mrs. Carbines (the Hawthorn Librarian) and Mr. and Mrs. J. J. Freame. The Show was officially opened on 16/11/42 by the Mayor of Hawthorn, and remained open for a month. Many hundreds of names and addresses of interested young people were obtained.

After the Show the F.N.C.V. appointed a further sub-committee to deal with matters concerned with the Junior Club project in the future. It had the following members:—

Mr. S. R. Mitchell (convener), Mr. and Mrs. J. J. Freame, Messrs. H. P. Dickens and F. S. Colliver.

Later, the following were also asked to take part:—

Messrs. P. C. Morrison, H. T. Reeves and L. W. Cooper.

The sub-committee held a meeting on Friday, 6th August 1963 at the Hawthorn Library, to complete final arrangements for the formation of the Club. The Club was to be called *Junior Field Naturalist Club* (Hawthorn Branch). Mr. S. R. Mitchell was elected President, Mrs. M. E. Freame (Honorary Secretary and Treasurer), and Mr. H. T. Reeves as Lanternist. Mrs. Carbines was to act as a Liason Officer between the Club and the Hawthorn Council.

The First Year

The inagural meeting of the Club was held on 27th August 1943. The topic of the lecture was "Under the Big Trees" by Mr. C. Lang, which dealt with the flora and fauna of our forest country. A good attendance of children was reported despite the school holidays.

At the meeting held on 24th September 1943, a subscription of 2/6 per annum for Juniors was introduced, and 12 members were enrolled. A printed card was forwarded to all members informing them of the meeting and the topic.

The first excursion was held on 2nd October 1943. The subject of interest was "Rocks of the Hawthorn District". The leader, Mr. O. Singleton took the children on a survey of Studley Park, Another Nature Exhibit was prepared in the Hawthorn Library on 4th-9th October 1943 by Mr. Mitchell and Mr. and Mrs. Freame, to give further publicity to the Club.

Demonstration evenings were a feature of early meetings, with up to 4 F.N.C.V. members demonstrating techniques of collecting and preserving in various branches of Natural History. These were held in March and November, 1944.

Attendance at the first meetings were fluctuating, and efforts were made to encourage the Boy Scouts and Girl Guides of the district to attend meetings. A large attendance of Guides and Scouts was reported for the June meeting of 1944.

In August 1944 the club celebrated its first birthday, and after the lecture, all enjoyed a piece of the cake made by Mrs. Freame specially for the occasion. The annual Birthday Night is still a feature of the calendar each year.

The Club: 1943-1958

These years may be said to constitute the first period of Club history, as they correspond with the term of office of Mrs. Freame as Secretary/Treasurer. During this period, the chairman was usually chosen from the group of F.N.C.V. members who attended meetings. Mr. I. C. Hammett

took the chair for a short period in 1944, but Mr. S. R. Mitchell remained President at most meetings until about 1948 when he was unable to attend regularly. Mr. A. A. Baker then usually took the chair.

The best years of the Club during this period were 1948-1951. During this time attendances were nearly always above the 50 mark, and on more than one occasion reached triple figures. Membership reached a peak of 80 in September, 1950. One of the few reports of a meeting ever recorded in *The Victorian Naturalist* is repeated below:—It was written by Miss M. Wigan, F.N.C.V. council representative to the Club at the time, and is found in Vol. 68, No. 6, October 1951.

> "The Hawthorn Junior Field Naturalist Club celebrated it 8th birthday on 31st August (1951). Mr. A. A. Baker occupied the chair, and before commencing, welcomed the Mayor and Lady Mayoress, the guests for the evening; introduced Miss Ina Watson . . . and warmly congratulated Mrs. Freame whose untiring enthusiasm is largely responsible for the success of the Club . . ."
>
> Miss Ina Watson gave an illustrated address on "Skokholm Island" and greatly interested the meeting on the banding of English Sea Birds, connecting it with the present banding of Silver Gulls at Altona.
>
> The usual many fine exhibits were on the table, and the exhibitors (all junior members . . .) gave their own description of them.
>
> At the end of the meeting refreshments, provided by the parents. were very much enjoyed by the 105 present."

After the first excursion in 1943, no record of field work occurs for some years. A number of outings were organised in the period 1947-1951, often in conjunction with the F.N.C.V. excursions.

Two interesting examples of this co-operation were on 12/6/50 when 23 Hawthorn Juniors attended the F.N.C.V. excursion to Sherbrooke Forest and Kallista in their own bus to study Lyrebirds; and earlier, on 23/4/49 when a number of members attended the F.N.C.V. Maranoa Gardens Excursion where Mrs. Freame and several of the Juniors planted trees.

Outings organised by the Club alone included a very successful day at Keilor Caves—Arundal Bridge, in June 1948. About 70 members and friends attended this excursion, and Mr. P. Fisch, as often on excursions, took over 20 people in his truck.

> " . . . lunch was enjoyed at Arundal Bridge before journeying to Keilor Caves. Thereafter the Juniors, armed with hammers and picks found some interesting fossils . . . Earlier a colony of Mud Wasps was examined." (From note by M. Freame— **Vict. Nat. 65** (5).

A feature of club activities in the 1940's and early 1950's was the Nature Shows and the Associated Exhibits organised by the Club. The Hawthorn Junior exhibits at the F.N.C.V. shows held at the Hawthorn Town Hall in October 1948 and 1949 were described in reports as among the best. On November 1st and 2nd, 1951, the Club organised its own show in the Town Hall with the Juniors preparing all the exhibits. The Club also had exhibits at Children's Exhibitions in the Melbourne Town Hall and the Exhibition Buildings in March, 1946 and May, 1947 respectively.

From the proceeds of the 1946 Show a bank account was opened for the Club in August, 1946. Subscriptions remained at 2/6 per annum for Juniors until August, 1952, when a postal rise brought about an increase to 3/6d. By 1958 Junior rates had risen to 4/- due to a further postal increase. An adult subscription was introduced in 1947 as a number of F.N.C.V. members considered that they should also pay a fee. This was

set at double the Junior rate of subscription.

In July, 1951 the Club set up its own library. Twenty books were donated or acquired, and the F.N.C.V. agreed to send the *Naturalist* in future. Mrs. Carbines, the Hawthorn Librarian, was in charge. The fate of the library is not recorded, but it does not exist today.

From 1954 to 1958 was a time of low membership in the Club, when the efforts of a few F.N.C.V. members kept the Club going. Mrs. M. Freame had now moved out of the Hawthorn district, and it was impossible for her to be so active in the Club. After an unsuccessful outing to Seaholme in May, 1954, no further excursions were held until 1958. Activities appeared to be restricted to the monthly meetings.

The Club under the Leadership of Mr. P. Fisch (1958-1962)

In August, 1958, Mrs. M. Freame retired as Secretary/Treasurer after a term of 15 years in office. An announcement was made of her retirement at the General Meeting of the F.N.C.V. held on 14th July, 1958, and Mr. Paul Fisch took over her responsibilities at the meeting on 29th August, 1958. The Fisch family had been closely associated with the Club for many years. Mr. Fisch had often given talks to the Club, and was probably called on to take the chair at meetings when Mr. Baker could not attend.

During Mr. Fisch's 3½ years as Secretary/Treasurer, the Club records give a good picture of its activities. Club membership during the period was the smallest in the Club's history, being comparable, however, with the period immediately preceding it (viz. 1956-1957). It remained almost unchanged, and varied from 12 to 24 members respectively. Fortunately attendances at meetings were usually somewhat higher. The President, during this period was Mr. H. P. Dickens, a member of the original foundation committee of the Club.

Under Mr. Fisch, the first recorded excursions since 1954 were held, and again became a regular part of the Club's activities. Healesville Sanctuary, the Organ Pipes, and Wonga Park were only a few of the places visited.

Junior subscriptions in 1959 were increased to 5/- and Adults to 10/- per annum, following a further postal increase. It appears from the records that no birthday celebrations were held in the years 1958-60.

In the latter years of his leadership of the Club, Mr. Fisch became increasingly concerned about the President, Mr. Dickens, because of his inability to attend many meetings. Accordingly, Mr. D. McInnes, then President of the F.N.C.V. was invited to preside at the 18th birthday night on August 25th, 1961. Mr. McInnes later took over as President on the retirement of Mr. Dickens in April, 1962.

A Year of Change

1962 was a year of change for the Club. On the 6th April, members were stunned to hear of the sudden death of Mr. Paul Fisch (Secretary/Treasurer), who had attended the Club's March meeting only a few days before. Mr. H. P. Dickens, by now in his 90th year, retired as President in a letter to the F.N.C.V. in the same month.

Mr. D. McInnes, the outgoing President of the F.N.C.V., took over the Presidency of the Club and the task of arranging the programme. Miss E. Wallace, who had succeeded Mrs. Carbines as Chief Librarian at Hawthorn, became Secretary/Treasurer.

This change was of great significance for the Club, because for the

first time there was a break with the previous organization. Whereas Mr. Fisch had more or less continued the Club under the same pattern through his long connection with the society, changes were now inevitable, as Mr. McInnes had attended only one meeting prior to his acceptance of Club leadership.

Mr. McInnes began by encouraging Club members to take a greater part in the Club organisation. He saw, in the publication of a Club newsletter, an essential part in Club expansion. Tim Shaw, a relatively new member of the Club finally came forward and offered to edit and duplicate a monthly news circular. With the assistance of his friend, Barry Cooper, Tim published the first news letter in September, 1962, which consisted of a single duplicated sheet.

Mr. McInnes, also being the organiser of the annual F.N.C.V. Nature Show in the Lower Melbourne Town Hall each September, arranged an exhibit for the Club for the 1962 Show on—"How to polish a Rock Pebble". The Nature Show, in future years was to give the Club the publicity necessary to bolster membership. Already by June 1962, membership had passed the 40 mark.

The Recent Years

The period from 1963 onwards has been an era of unprecedented development in the history of the Hawthorn Juniors. The reasons for this expansion are not hard to find. With the inspirational leadership of Mr. McInnes, the Jniors themselves began taking an important part in Club organisation. The annual Nature Show and the newsletter all played their part. With development also came an increase in administrative efficiency. This, with an increase in Club membership, changed the whole outlook of the Club. Unavoidably Club leaders have lost much of the personal contact with members, which was so apparent under the leadership of Mr. Fisch.

Some of the achievements of these years are summaried below to complete the record. More detailed reports have been published in the *Naturalist* since 1965.

Membership during this period rose until it reached a peak of 170 in May, 1967. Meeting attendances also rose and averaged well over 100 for that year.

The Club is now administered by a Council which was created in 1963, originally to prepare an exhibit for the Nature Show in that year. Its members have consisted almost entirely of Junior members who work with Mr. McInnes in organising the Club. From the the initial number of eight members, Council now has a membership of 19.

Excursions have been a regular part of Club activities, and up to six outings were held each year. Some were held in conjunction with F.N.C.V. excursions. Places visited included such widespread areas as Werribee Gorge, the You Yangs, Hanging Rock, Belgrave, and Fossil Beach, near Mornington. Attendances vary, but the highest recorded was 75 at Werribee Gorge excursion on 25/2/67.

The newsletter and additional publications have been an important part of the activity of the Club since 1962. In January, 1963, the newsletter was named "The Hawthorn Branch" and its size extended to four pages. Until 1965 Tim Shaw was in charge of all publications. Under him two major publications were produced — "How additional publications were produced —"How To" (Methods of preparing and setting Natural History specimens) and "The Hawthorn Branch, 1963" (a re-edited collection of 1963

newsletters). In August, 1965, a Publications Committee was formed to organize all club publications. Paul Gahan altered the whole format of the newsletter, and it was re-named "The Junior Naturalist" in October, 1965.

A large number of additional publications have since been produced, including—"Preserving Marine Specimens" by Leigh Winsor; "The Collection and Preservation of Insect Specimens" by Dennis Walsh; and "The Observation and Collection Record Book" by Paul Gahan. A feature of the newsletter and additional publications since 1965 has been the large number of members involved in their production.

In 1965 an agreement was made with the F.N.C.V. Hon. Librarian, Mr. P. Kelly, for books to be borrowed by members. Members now borrow a book at one meeting and return it within two months.

Since 1963 the Club has been served by many office bearers, partly because of the division of the work load among Council members, and the periodical resignation of Council members, which cannot be avoided. In May, 1964, Miss E. Wallace retired as Secretary/Treasurer. Her responsibilities were divided, and now both offices of Secretary and Treasurer are held by Council members. The office of Excursion Secretary was also created.

By 1968 subscriptions were fixed at 80 cents for Juniors and $1.20 for Adults.

Conclusion

In 25 years of continuous activity, the Hawthorn Juniors have shown that they can cater satisfactorily in stimulating a curiosity for natural history in the younger generation. The Club has been fortunate in having a person like Mrs Freame to administer the Club for so long, and to have others to take over in times of crisis.

Initially the problems of the Hawthorn Juniors were discussed regularly at F.N.C.V. Committee meetings. Later, in June, 1974, a Youth Movements Sub-committee was formed in order to co-ordinate all Junior activities. This Committee, ultimately, dealt mainly with the activities of the Hawthorn Juniors.

The Youth Movements Committee was discontinued after the mid 1950's, and no co-ordinated organisation of Club activities has since been effected by the F.N.C.V.

Acknowledgements

This article has been made possible only by the use of minute books prepared by Mrs. M. Freame and Mr. P. Fisch.

Thanks are also due to Mr. D. Lee, Hon. Secretary F.N.C.V. for allowing the author use of the F.N.C.V. Council minutes (1941-1954), and to many long-standing Members of the F.N.C.V. who have answered questions and discussed at length with the author, the early history of the Hawthorn Juniors.

Note: The author will be interested in any information that members may have, concerning the early history of the Hawthorn Junior F.N.C. in addition to that already existing.

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Field Naturalists Club of Victoria

General Meeting—8 July, 1968

About 200 were present and the President, Mr. E. R. Allan, was in the chair. He announced the death of Mr. W. Lloyd Williams, the club president in 1967, who had retired through illness. He had been a member since 1937 and a council member for a long time. Members stood for a minute in silence in respect to his memory. Mr. J, Baines spoke of the work of Mr. Williams, who, since early days, as a teacher in Ararat, had been interested in the flora, especially orchids. He became editor of the Education Department's Education Gazette and Education Magazine and the School Paper, and thus had a strategic position to influence people for nature conservation and to extend knowledge of flora and fauna. He was a fluent, capable writer on a great variety of subjects and with a delightful sense of humour. He spent some time in Thailand in connection with educational journalism and took an intense interest in the surroundings and gave us some impressions of that tropical part. Not only in natural history and educational journalism was he interested, but also in Australian history. He wrote "History Trails in Melbourne", describing old buildings. He took on the presidency when he wasn't too well. On President's Day he carried out his duty in leading the excursion to the Macedon area and Hanging Rock although far from fit.

The President, Mr. Allan, announced that the club has the pleasure of making honorary members after 40 years' membership, and the Council had recommended that Mr. A. J. Swaby be made an honorary member. The meeting carried this recommendation with enthusiastic acclamation. Mr. J. H. Willis spoke of Mr. Swaby's association with the club since he was elected to membership in July, 1928. He recalled Mr. Swaby's first exhibits at a metting. These included spiders, moths' cocoons and ferns. From then on hardly a month passed without some exhibits showing a wide range of tastes. He published in 1934, an article on Agarics, and in 1935 a note on the Gum Emperor Moth. Succeeding *Naturalist* publications showed that two pet ideas were ferns, and the vegetation of the Grampians and Little Desert. He compiled a list of 270 species (5 not seen by others). Mr. Swaby urged preparation of a new fern book, and his efforts were rewarded by the work of N. H. Wakefield. He took an interest in youth organizations, adult education, laying out nature trails, the development of Maranoa Gardens, wrote articles for

cultivation of native plants in the garden, was a leader for excursions and helped in nature shows. He was president in 1956-7. The President, Mr. Allan, presented the Honorary Membership Certificate to Mr. Swaby in recognition of his valuable services. Mr. Swaby in responding said he was overwhelmed by the research of Mr. Willis into the past. He thanked the members for the honour. He had been assistant secretary and secretary of the club, and had nominated Stanley Colliver for the position of assistant secretary. He had seen a lack in the club to give encouragement to the formation of country branches or affiliants when the only one was at Ararat, and he wanted to see this F.N.C.V. club encouraging teachers to join up and influence children. The attitude to country clubs has changed now, but still we haven't a proper organic connection. They are near to nature, we are near libraries. We could work together. The President said that Council will see what can be done.

The subject for the evening was a talk by Mr. J. R. Garnet: "Victoria to Broken Hill, via Cooktown". The route of the nine and a quarter thousand mile journey was outlined on a map of N.S.W. and Queensland. Interest in orchids led Mr. Garnet to hope to see the Cooktown Orchid in situ. Beautiful colour slides projected by Mrs. Garnet illustrated the description of the travels. Many National parks and reserves were visited in N.S.W., including Gilgandra Wild Flower Reserve; the Warrumbungles; Siding Springs; Kuring-gai Chase; Bobbin Heads; the famous burning mountain first described by Major Mitchell; New England National Parks; Dorrigo; Grafton National Park; Byron Falls—the longest in the Southern Hemisphere. In Queensland the Lamington National Park at Binna Burra showed a striking contrast between the Tropical Rain Forest vegetation and the mallee type of vegetation of Dave's country. A Brookvale Park is now opened where the Darling Downs Naturalist Club has grown native vegetation after a fire. An outstanding plant grown there from a rare seed is *Acacia denticulosa.* The Queensland bottle tree, *Brachychiton rupestris,* valuable for shade and for fodder when the top is cut off, was shown.

Continuing north the Bunya Bunya Mountains showed the pines which used to attract triennial gatherings of aborigines for the edible seeds. Past the photogenic Glass Houses; Buderium, famous for ginger; Mt. Morgan Mines and Townsville, scenes of beautiful flowering grevilleas, grasstrees, termite mounds and blue water lilies and brolgas from the Townsville swamps were shown, and at Green Island some of the marine life was viewed. A striking Flindersia tree supported a mass of epiphytes, chiefly *Dendrobium teretifolium* (pencil orchid) in flower. From Kuranda to Cape York the scene changed from the tropical rain forest type to drier vegetation and sclerophyllous forest. A yellow deciduous *Cochlospermum* was in flower on granite and quartz ranges. Across the Annan River, Black Mountain, of black rock coated with manganese dioxide and iron oxide, bound by lichen, shows pieces of broken rock from 7 to 20 feet in diameter, making a pyramidal shaped cairn-like mass with mysterious caves, Natives will not go near them, believing people to disappear there. Scenes of Cooktown with sandbars at the entrance of the Endeavour River, and the mountain sloping straight to the ocean were shown; including paper bark trees, necklace plants with button-like leaves, and ants plants with bulbous bases colonized by ants. The Cooktown orchid was not in evidence because of its sales value, but *Cymbidium canaliculatum* with no commercial value was plentiful.

Returning through Mossman, Trinity Bay was one camp site where Cook landed before he went north. From Cairns through Herberton to Mt. Garnet, millstream basalt falls reputedly the widest in Australia were seen; past Hughenden and basalt black flats with yellow lilies and solanums; Muttaburra with long stretches of plain and fossils in the sandstone; Barcaldine with hot water containing, H_2S; Blackall and petrified forest; Tambo; Roma where fossil wood was found; Dalby now cleared of prickly pear; and Theodore in the Fitzroy River basin. A highlight of the central journey was the Carnarvon National Park of 17,000 acres in a range with enormous gorges with smooth white bark eucalypts; cabbage palms; macrozamias; crimson grevilleas; flannel flowers; *Casuarina cunnighamii.* Pictures of possums, goannas, and currawongs were shown. Aboriginal paintings are found on the sandstone cliffs. *Calandrinia balonensis;* carpets of composites; bushes of calytrix, grevilleas; wilgas—were some of the plants shown. The return journey through

Broken Hill included a stop at the beautiful Mootwingee reserve. The President thanked Mr. Garnet for the most interesting talk.

EXHIBITS:

J. R. Garnet—1. Fossil wood from petrified forest, Cent. Queensland (Blackall). 2. Mesozoic marine sediments—from roadside between Hughenden and Muttaburra, including large shells and ammonite. 3. Seeds of *Macrozamia moorei*—an abundant cycad of Carnarvon National Park, Q'land. 4. Bean tree pods from Babinda. 5. Collection of fruits washed upon the beach of Quarantine Bay. 6. Large snail from rain forest in Lamington National Park. 7. Pericarp of *Flindersia maculosa* (leopard tree) from Wilcannia. 8. Fruits of *Brachychiton rupestris* (Queensland bottle tree) from Roma. 9. Bushy clubmoss from Bingil Bay, Queensland.

A. Lewis—*Phebalium lamprophyllum* and *dentigera*, Brisbane Ranges.

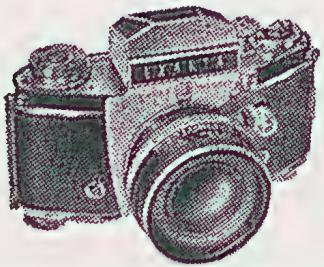
A. J. Swaby—1. Spray of satinwood. *Phebalium squameum*, stellate hairs of it under the microscope and polished wood of it with wood. 2. From blackwood (*Acacia melanoxylon*). 3. A mock olive (*Notelaea sp.*) as a contrast. 4. A picture of a flowering spray of Lobelia gibbosa taken on the 23rd day after it was picked and hung on a nail without water. It died on the 40th day. This is an annual plant which slowly dies from the roots up, using the sap for the flowers and seeds. 5. Grevillea sericea, N.S.W., which is never without a flower in the garden. 6. *Acacia botrycephala* (sunshine wattle), E. Vic., Tas., N.S.W. 7 *A. podalyrifolia* (Mt. Morgan Silver Wattle). 8. Two fungi, *Aleuria aurantia* (asco-fungus), *Polyporus semisupinus*, from Coranderrk.

Miss J. Galbraith—Mistletoes: 1. on Callistris only, *Muellerina bidwilii*. 2. *Amyema cambagei* on sheoak. 3. *Atkinsonia ligustrina*—a bushy shrub; parasitic on roots of several shrubs (Black Mountain). 4. Cactus Mistletoe—*Korthasella japonica*. 5. *Notothixos cornifolius*—parasitic on eucalypts. 6. *Notothixos subaureus* (gold leaf mistletoe) on *N. cornifolius*. It is always parasitic on a mistletoe, but not always on this one. Found Queensland to Mallacoota.

T. Sault—Two boxes of fungi each with about 30 species from the back of Rosebud.

Mrs. Gibson—*Acacia lineolata* (W.A.) in flower.

Mrs. E. King—*Arisarum* sp. in flower.



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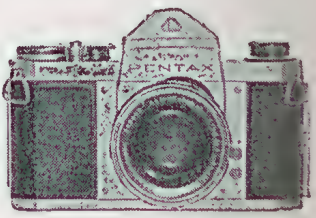

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The Secretary read a letter from Dr. D. H. Ashton, of the University, asking for help in mapping trees around Melbourne by reporting occurrence of species of Eucalyptus, including red gum, yellow box, yellow gum, swamp gum, manna gum, messmate, grey box, white mallee, etc.

Reports of marsupials for a survey are also required by the Fauna Survey Group. An appeal for a sales officer to help Miss McLaren was made by the President. Mr. J. Baines told of a revised list of Birds of South Australia. He sugted that an encouraging letter from the club be sent to Mr. Max Fox, Federal member for Henty, for his efforts in preserving the red kangaroo.

Three new members, whose names appear in the July Naturalist were elected.

Botany Group Meeting—11 July

Twenty-four members and visitors attended, and Mr. Bruce Fuhrer presided. The guest speaker was Miss Jean Galbraith, whose subject, "Flora of Australia", began with a summary of the geological history of the island from the Ice Age onwards, its present climatic conditions, and the various habitats and ecological conditions producing a flora in some ways similar to Victoria's, but in others surprisingly different. Among the many slides screened was *Blandfordia marginata,* a close relative of which, the well-known Christmas Bells, is found in New South Wales; but the genus is absent from Victoria. Several of the eight Tasmanian species of *Richea* were shown; this genus being in some areas dominant and spectacular, whereas Victoria has only one species.

Reference was made to the notorious Horizontal Scrub (*Anodopetalum biglandulosum*) and to the Tasmanian Waratah (*Telopea truncata*). Tasmania possesses numerous species of heaths, including, in addition to *Richae,* attractive species of *Cyathodes, Prionotes, Pentachondar, Trochooarpa, Archeria, Dracophyleum,* as well as the better-known (to most Victorians) *Epacris, Leucopogon,* and *Sprengelia.*

Miss Galbraith's four visits to Tasmania were highlighted, she said, by her first acquaintance with the varied and delightful Alpine cushion-plants. Three of the four projected volumes of ..The Student's Flora of Tasmania", by Dr. Winifred Curtis, are now available, and her work will be completed after her return from her present visit abroad,

Questions on the much-appreciated talk, and inspection of speciments exhibited completed a memorable evening, and Mr. Fuhrer expressed the thanks of all.

Group Meetings

Botany Group—Thursday, 8 August: Members' night.
Thursday, 12 September: Mr. J. Willis.

Errata

In the report of the general meeting held on 12 June (*Vict. Nat.,* Vol. 85, No. 7, p. 209), a number of errors were made. Professor Salmon, of the Victoria University of Wellington, was responsible for all of the 543 colour slides reproduced in "New Zealand Flowers and Plants in Colour", as well as writing all the captions and the ecological text, in fact, his was an astonishing one-man effort. Mr. Ray Richards, of the New Zealand firm of A. H. and A. W. Reed (which at that time had just established a branch in Sydney) made a number of visits to Australia, and it was he who suggested the invitation to Mr. Ross Cochrane, at that time at Melbourne University and later at Monash, now of Auckland University. The Japanese firm that does such excellent colour reproductions cheaply is not the 'Kyato Press' but the Kyodo Printing Company, of Tokyo. The correct title of the eagerly awaited book jointly authored by Messrs. Rotherham, Fuhrer, Willis and Cochrane is "Flowers and Plants of Victoria in Colour": the book will be published early this spring, and will sell at $9.50 per copy. Like its New Zealand counterpart, it will contain 543 colour plates, and, used with Mr. Willis' "Handbook to Plants in Victoria", will constitute a comprehensive guide of the Victorian flora.

Geology Report, 3rd July

Twenty-two members attended with Mr. Davidson in the chair. The subject for the evening was a talk on Paleobotany by Dr. J. Douglas of the Mines Department of Victoria. The speaker, with the aid of maps and diagrammatic sections, outlined the story of the plant kingdom in Victoria from its emergence in the Upper Silurian-Lower Devonian period to the present. He said that probably the most famous of all fossil plant

remains is that of *Baragwanathia longifolia*, one of the oldest known vascular plants and first discovered in Victoria. Although a land plant, it had no conducting tissues and is found in marine deposits of Upper Silurian - Lower Devonian age, often in association with *Monograptus* species, marine organisms. He then spoke of the flora a little higher up on the Geological Scale. From the Upper Devonian through the Carboniferous, the Lycopods flourished, the most notable being *Lepidodendron*, characterized by the diamond-shaped leaf scars on the stem. In the Glacial periods of the Permian the plant *Glossopteris* seemed to be the main representative of the cold climate existing then. The speaker said that at the beginning of the Mesozoic a large number of new Orders and families burst into prominence, many of which disappeared just as suddenly at the end of the Mesozoic. The most important divisions were the Pteridosperms (Seed Ferns) now extinct, which had the seeds under the leaves, and the Gymnosperms, of which the Cyclads and the Conifers were the most abundant. Many of these carried through to the present. The Ginkgo was prominent also, and the speaker mentioned that the sole surviving member of this group, the Maiden Hair tree still lives on in Central China. The speaker also remarked that it was a strange coinicidence that the Dinosaurs, which emerged with the Mesozoic flora also died out with them. He then pointed out that the Angiosperms, the most important group living today, began their existence at the end of the Mesozoic. He said that at the time of the laying down of the Brown Coal deposits at Yallourn, conifers were abundant in that area, and also the *Nothofagus* (Beech) of which one species still exists in Victoria. This indicates a much wetter climate than exists today. He said that the dry sclerophyll forest with the Eucalyptus-Acacia type flora that exists today did not appear until 10-20 million years ago. The speaker explained the laboratory method of extracting fossil leaves from the parent rock by the use of acids and after much chemical preparation a cross section of the leaf can be examined under the microscope. The structure of the epi-derm and the stomata reveals the climate at the time of the plant's existence. The speaker concluded by naming some of the known fossil plant deposits in Victoria. The Chairman thanked the speaker on behalf of the Group for a very interesting and instructive talk.

EXHIBITS:

Mr. Davidson—Opalized Wood—Tertiary; Tas. and Gelantipy. Vic. Fossil Fern, *Taeniopteris* — Lower Cretaceous; Inveroch. Fossil Wood, Brown Coal mine, Altona. Fragments of plants, Horsetails—Triassic; Bacchus Marsh. Glossopteris leaves—Permian; Bacchus Marsh. Fossil leaves—Tertiary; Bacchus Marsh.

M. Costermans—Fossil leaves, Splenopteris sp., Koonwarra, Vic.

Mr. Wigmore—Quartz-Dolomite-Pyrite vein, AI mine, Gaffney's Creek, Vic. Quartz, Dolomite Crystals, AI mine. Garnetiferous Gneiss, Bethanga. Granodiorite, Adelong, N.S.W.

Mr. Sault. Fossil leaves—Tertiary; Narre Warren. Fossil leaves — Tertiary; Bacchus Marsh. Fossil plant remains—Lower Cretaceous; Mt. Eliza.

Mr. Love—Fossils—Oligocene; Waurn Ponds. Coal (Black Mat)—Lower Cretaceous; Ceres. Hornfels—Upper Oligocene; Waurn Ponds. Fossil Fern (*Taeniopteris*) — Lower Cretaceous; Ceres.

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F.N.C.V. DIARY OF COMING EVENTS

GENERAL MEETINGS

Monday, 12 August—General Meeting at National Herbarium, The Domain, South Yarra, commencing at 8 p.m.

1. Minutes, Reports, Announcements.
2. Correspondence.
3. Subject for evening—"Birds", Roy Wheeler.
4. New Members—
5. General Business.
6. Nature Notes and Exhibits.

Monday, 9 September—"New Zealand for the Naturalists". J. H. Willis.

Monday, 14 October—"Look into those Flowers". A. Swaby.

GROUP MEETINGS

(8 p.m. at National Herbarium unless otherwise stated)

Wednesday, 21 August—Microscopical Group.

Friday, 30 August—Junior Meeting at 8 p.m. at Hawthorn Town Hall.

Monday, 2 September—Entomology and Marine Biology Group at 8 a.m. in Mr. Strong's rooms in Parliament House.

Wednesday, 4 September—Geology Group.

Friday, 6 September—Junior Meeting at 8 p.m. in Rechabite Hall, High St., Preston.

Thursday, 12 September—Botany Group.

F.N.C.V. EXCURSIONS

Sunday, 18 August—Kinglake The coach will leave from Batman Avenue at 9.30 a.m. Fare $1.50. Bring one meal and a snack.

Saturday, 31 August to 8 September—Grampians. The coach will leave from Flinders St., outside the Gas Corporation. on Saturday. 31 August. Bring a picnic lunch. Day excursions planned, include Mt. Zero, Mt. William, Delleys Dell, Sliverband Falls, Big Hill, Wonderland, Bunjil Cave (Vic. Nat. 74—2. pp. 19-22), Bellellen, Aboriginal Quarry (Vic. Nat. 78—3. pp. 71-74), Lake Fyans, Lake Wartook, Flat Rock (Vic. Nat. 73—2, pp. 21-23), "Cave of Ghosts" (Vic. Nat. 78—11, pp. 335-336), McKenzie Falls, Zumsteins, Mt. Difficult Quarry, Jimmy's Creek, Pomonal, etc. Members of Stawell, Ararat and Horsham F.N. Clubs are co-operating in these excursions.

PRELIMINARY NOTICE

19-20 October—Weekend excursion to Bendigo District and Wychitella Forest. Overnight stop at Charlton. Details next month.

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The young (about two months) of The Boobook Owl.

photo: The late Ronald K. Munroe.

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Front Cover:

Graham Pizzey photographed this female Red Kangaroo and joey near Jerilderie in N.S.W. Let us hope that future generations will not have to rely on photographs to observe these fine marsupials.

The Portland Week

Dec. 26th to 31st, 1967

On our way to Portland we visited Tower Hill, the biggest and most recent of Victoria's extinct volcanoes. Now a wildlife sanctuary, it is being slowly returned to forested hills and lakes as was described by the early settlers. Later, birds and animals will be introduced, but at present it is very dry and bare.

Contrary to the usual naturalists' practice, we started with a tour of the new port and harbour facilities. Portland, the oldest town in Victoria, now has the newest port, functionally designed in one piece and strikingly different to those of older cities. To add interest, an oil barge was in, a monster with hollow legs, lit like a Christmas tree at night. Most of us did not know what it was when we sighted it from miles off shore.

We had time for photographs, and then boarded the coach. Mr. Noel Learmonth and Miss Ina Watson, both residents and F.N.C.V. Club members, guided us to a sheltered bush picnic place for lunch. Victoria is too near the Roaring Forties to have many windless days; and this day certainly proved that point.

Velvet Bush was our special find here, together with the usual flora of coastal dunes, for example *Calocephalus brownii, Correa alba reflexa, Exocarpus stricta, Leptospermum juniperina, Leucopogon parviflora, Melaleuca gibbosa, Lotus australis, Senecio lautus, Pimelea humilis-octophyllus, Scaevola albida.*

A look at Cape Nelson lighthouse, and the rugged coast preceded our return, during which a stop was made at a little sanctuary where there stands a cairn to mark the most southerly point of Major Mitchell's expedition. There would have been a fine showing of wildflowers earlier in the year; especially so in a wetter season.

Next day we set off with Mr. Cliff Beauglehole to the Cobbobbonee forest and into the Glenelg country. The long struggle for a reasonably large National Park in this important area seems to be drawing toward a satisfactory conclusion. Among many fruitful stops, the one at the Inkbottle was the most interesting. It is a deep, dark lake of brown peat water, and sustains fish; but appears to have neither entrance nor exit. Near here we found, *Olearia speciosa, Brunonia australis, Eucalyptus vitrea, Goodenia humilus, Pultenea stricta-juniperina, Billardiera scandens, Villarsia exaltata, Acrotriche, Indigofera australis, Pratia pedunculata, Helichrysum blandhowskianum.*

Lunch was at a lookout-picnic area, high over the Glenelg River at a bend so sharp, that we could see up and down stream, and in just what a deep rift the river flows. We then went to Moleside, Little Moleside, and Learmonth Creeks, all just running, with the vegetation very dry. Here we were in fern gullies and tall timber. We saw both the tree ferns and many small ferns, but had no time to count all the species that may have been there.

Mr. Learmonth showed us the pel-

lets of fur and crushed bones, which the Powerful Owl disgorges when he finds his mouth too full of the remains of his latest meal.

That evening we returned through many miles of *Pinus radiata*, the Forests Commission's softwood plantations.

On Friday with Miss Watson and Mr. Davies, we went to Mt. Richmond National Park, and an old volcano cone, between 15,000 and 20,000 years old, and 730 ft. high. The 2,000 acres supports 450 species of plant. On the way, Mr. Davies tried to find the emu with thirteen chicks which was on his property, but was unsuccessful. From the road we saw large flocks of Straw-necked Ibis feeding and thus helping to reduce the grub and insect pests of the paddock. Through Cashmore, heath land, originally poor soil, is now useful farming land, due to the inclusion of trace elements.

Showers of rain reduced both visibility and botanizing, so we left the Mt. Richmond National Park with only a small list of "treasures" found—*Brunonia australis, Leptospermum juniperinum, Acrotriche serrulata, Leucopogon virgatus* and *parviflora, Hibbertia, Banksia marginata, Euc. ovata, Pimelia flava, Senecio lautus, Adiantum aethiopicum, Olearia specio, Centaurium minus, Wahlenbergia, Euc. baxteri* and *vitrea, Dianella pevoluta.*

Because of rain we passed by the Bridgewater Lakes. The sand dunes seen from here were formerly drifting sand, but are now stabilized. It is believed that there is a rare marsupial on the other side of the lakes. Bridgewater and the surrounding land was amongst the first settled, and the pioneers' names are still carried on in the district, such as Kittson, Lightbody and Kennedy. Probably the oldest continuously occupied house is the Lightbody's, still the family home of some of the descendants. We lunched in an old schoolhouse, No. 32, which is now used as a hall, and then travelled on to Bridgewater Bay and to the high cliffs at the blowholes which were not "blowing". They seldom do these days, perhaps due to a change in rock formation. Some of us walked along to the Petrified Forest—sandstone trees or treetrunks, some fallen, and many still upright, on top of one of the highest coastal cliffs in Victoria. Plants in this district included *Melaleuca, Casuarina stricta, Rhagodia baccata, Clematis microphylla, Myoporum insulare* and *viscosum, Senecio lautus, Salicornia, Wilsonia humilis, Samolus repens, Apium australe,* and *Carpobrotus.*

Saturday was our longest day of driving, and after collecting Mr. Davies, Mr. Hardy, his son and daughter, and Miss Lineker, we went through the Cobbobonee forest again on a road parallel to that taken on the first day. Mr. Davies mentioned many sightings of a strange unrecognized animal seen over many years in this locality. Recently a Barred Bandicoot was seen.

All this heathland should be preserved as it sheds the headwaters of the Moleside Creek and tributaries, and it contains a distinctive flora. Farmers want it, foresters want it for softwoods, and naturalists want it for a reserve. Already Wright's Swamp has been drained, comprising 1,000 acres, previously the home of many water birds.

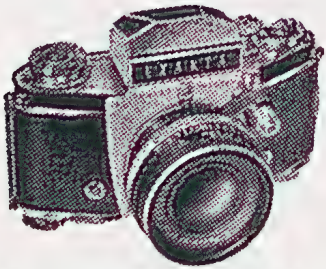
Most of the party entered the Princess Margaret Rose Caves, but they are poor in comparison with other limestone caves. Those who stayed with the wildflowers secured a fine collection, including *Ptilotus, Cassinia spectabilis, Helichrysum dendriodeum, Acrotriche serrulata, Astroloma cono-*

stephioides, and *humifusum, Epacris impressa, Leucopogon virgata, Thysanotus, Amperea xiphoclada, Hibbertia asciculata* and *australe, Dianella revoluta, Dipodium punctatum, Spyridium vexilliferum, Casuarina paludosa, Brachycome parvala, Logania albiflora, Busaria spinosa, Geranium pilosum, Kennedya prostata, Olearia ramulosa, Scaevola albida, Goodenia humilis, Boronia nana.*

A short visit was made to Mt. Gambier, where the Blue Lake was gloriously blue under a grey sky, and then the Valley and Brown Lakes and the Garden Rock Cave were visited. Back through Nelson, and over the new bridge on the Glenelg River to Portland, completed the day trip.

Sunday was our last day, and we had a free morning with time to look at the town and the old churches and buildings of Portland. After lunch Miss Watson and Miss Lineker took us to Mr. and Mrs. Learmonth's home "Caramar", at Tyrendarra. This was previously the home of Mr. Noel Learmonth. We were taken to see an Aboriginal stone fish trap, set in a very stony creek which no longer runs because the headwaters have been drained. It was easy to see how carefully the stones had been set, so that the fish could only swim one way. Nearby was an old sheep wash, made by the very early settlers in the days when the wool was washed on the sheep's back, instead of being scoured after shearing.

Mrs. Learmonth gave us afternoon tea, and showed us her lovely garden; pointing out the nests of the Scrub Wren, Blue Wren and Honeyeaters. A very happy finish to a most interesting and enjoyable week. Thank you, Portland Field Naturalists Club.



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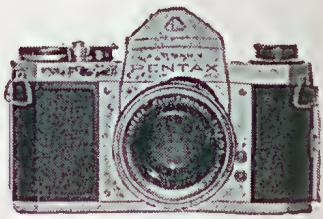

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A Note on the Baw Baw Berry

by Ellen Lyndon

In December last, we had occasion to collect a flowering specimen of *Wittsteinia vacciniacea,* the Baw Baw Berry, for a botanist friend. It is an Alpine shrub, known at present to be on only three mountain tops, Mts. Baw Baw, Cobbler and Lake Mountain. It belongs to the Ericaceae and flowers in early summer. The white berries ripen in the autumn.

Wittsteinia is an untidy bush with firm dark green toothed leaves, straggling amongst the rocks and often, on Mt. Baw Baw at least, growing in close association with the Snowgum, *Eucalyptus pauciflora,* and supported by the multiple trunks. The mountain tops are drought-stricken this summer and in early December even the boggy patches were drying out. We were, of course, many weeks too early for the main blooming of the Alpine flowers. Early too for Baw Baw Berry which still showed only tight green buds. Some anxious searching in favored places eventually rewarded us with the perfect little green bells that we wanted, and some were packed into an airtight plastic container for the return journey.

We made several stops on the mountain road where it crosses the most enticing fern gullies, plus an afternoon tea break, and two hours must have passed before we opened the box to see how our flowers were travelling. To everyone's surprise a wave of rich and spicy perfume filled the car. These insignificant flowers have a lovely fragrance that goes quite unnoticed out in the open. I recall that we spoke of Cloves and Carnations without really being able to put a name to it. I have since looked up the writings of Mr. Willis on flower perfumes in the *Victorian Naturalist* (December 1944, and Botany Group Report, August 1967), and would tentatively refer the scent of *Wittsteinia* to No. 4, the aromatic spicy type. Has anyone else noticed this feature of the plant?

The Baw Baw Berry.
photo: D. Lyndon.

The recipient of the specimen sent through the post, could detect no scent when her box was opened some days later, but others standing in water here retained it to some extent. Fresh buds as they opened did exhale some perfume but nothing so strong as that given off when the box of fresh picked flowers was opened for the first time.

Two Botanical Notes

By J. B. CLELAND

Blackberries

Baron von Mueller, whose era in Victoria extended from 1852 till his death in 1896, distributed the seeds of blackberry (**Rubus fruticosus* agg.) during his botanical expeditions partly to prevent erosion (see *Vict. Nat.* 76, June 1959, p. 33; 77, Jan, 1961, p. 258; and 77, April 1961, p. 354). The Baron was in South Australia before he went to Victoria but it seems unlikely that he distributed any blackberry seeds in South Australia, although some reperesentative of the *Rubus fruticosus* group was no doubt deliberately introduced into this State during the early days.

Black also records the distinctive cut-leaf species **R. laciniatus*. It is quite likely that seeds of both were brought out by some emigrant who thought that one of these might succeed in establishing itself better than the other. If they were introduced together, and not on separate occasions, the first-named has far outstripped the other. It has reached, or been deliberately conveyed to, the Encounter Bay district but **R. laciniatus* has not yet been found there. Blackberry has been noted on Kangaroo Island. Eichler in his *Supplement* records four other species. If these are valid, this would mean that in South Australia there had been no less than six (or more) separate introductions of the blackberry deliberately selected. This is surely unlikely.

It may be pointed out that Australia lends itself to the study of variations in plants derived from a single source. In some instances the introduction has been so unlikely that it is improbable that it took place more than once. In such a case, variations in the descendants would be within the range of a species which may be particularly liable to throw minor mutants. Does this explain the occurrence of the variations which Eichler gives as species? It would be difficult to come to a sound conclusion in such a matter in Europe, but more simple in Australia.

The same reasoning applies to the introduced **Centaurium*, though seeds of this plant might readily have been accidentally brought here more than once. Eichler considers three species have arrived here in addition to the native *C. spicatum*. Black, under the name **Erythraea Centaurium*, wisely says "a variable species" and mentions under this name that some botanists separate **pulchellum* and **littoralis* as species. Under *C. minus* (without differentiation), the plant is recorded from both Encounter Bay and Kangaroo Island.

Boerhavia diffusa

Bentham says that the genus *Boerhavia* is "widely diffused over the tropical and subtropical regions of the New and the Old World" and that this species "is a common weed in Africa and Asia". Black considered it uncommon in South Australia, but I have come across it in various places. Some plants have been in my garden at Beaumont (Adelaide) for forty years or more. It has gradually spread and with its long parsnip-like tapering edible root (5-10 mm thick at ground level) is firmly established on some of my gravel footpaths. Its long, spreading, more or less procumbent, branches break off readily at ground level from the rootstock, a useful device for plant survival if the tops are caten by grazing animals. In order to test its palatability for such animals,

some of these plants were gathered from my garden and fed to kangaroos on March 9th 1968 at the Cleland Wild Life Reserve near Mount Lofty. They ate them readily, holding them in their "hands" and munching with enthusiasm, although probably not very hungry at the time.

In March 1968 *Boerhavia diffusa* suddenly became widespread and luxuriant in many unworked parts of my garden, a proliferation that had never occurred before. One must assume that with their penetrating roots and brittle tops, they have come to stay until dug up. Bentham says, "Fruiting base of the perianth oblongturbinate, glandular-muricate when dry, enveloped in mucilage in hot water, from 1 to nearly 2 lines long". This small size (2 to about 4 mm.) probably explains its distribution over the garden, because the sticky perianth has adhered to passing objects.

The extent of this dispersal and the luxuriance of the plants seemed to indicate that the unusual weather conditions of the summer season of 1967-8 were particularly favourable to it, as they have been with *Amaranthus retroflexus* and, of course, *Portulaca oleracea*. This sort of weather resembles that in Central Australia where *Boerhavia* is common and the root is eaten by the natives (although its taste geems insipid to me). My rain gauge for 1967 registered a total of 1256 points for the year whereas we had 2490 points in 1966 which is near our usual average. In September 1967 we had 60 points of rain, in October 59 points, in November 3 points, and in December 52 points. On January 20th 1968, 158 points fell and on February 20th and 21st another 166, with 45 more on February 26th and 27th. The profusion of flowering plants of *Boerhavia diffusa*, as described above, was then seen in my garden by March 6th. Such a long dry spell, followed by two heavy falls of rain, resembles monsoonal weather, of which my *Boerhavia* has taken full advantage. Presumably the small seeds have been equally widely distributed in my garden on previous occasions but have come to grief because the weather conditions were not suitable for germination and survival.

Only a few native Australian plants have become weeds in my garden—*Boerhavia diffusa,Cotula australis, Sagina apetala*, and *Polycarpon tetraphyllum*. A *Danthonia* still comes up in the drive and new plants appear surreptitiously. There are, or have been, over 127 introduced weeds in this same garden. A challenge that I made some years ago for anyone to beat this has never been taken up. Perhaps I can claim a record?

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Wood Structure and the Electron Microscope*

By G. W. Davies

Since the invention of the microscope towards the end of the sixteenth century, workers in many fields have used its powers to assist in resolving problems involving all scientific disciplines. Botanists, particularly those studying descriptive anatomy, found the microscope to be of inestimable value, so that it was only a matter of course for microscopy to be the principal tool of early wood anatomists.

Naturally the instrument itself was altered considerably as techniques of optical and mechanical design progressed, so that the modern light microscope will magnify up to 2000 times. Parallel to these advances, the wood anatomist also had the advantages of improved sectioning, fixing, embedding, and staining techniques. As each of these ancillary factors improved with time, so the need for a greater knowledge of the nature of the cell wall grew, and the anatomist found that he needed still greater magnifications to investigate the finer points of cell-wall structure. The great breakthrough came with the invention of the electron microscope in 1932.

The Electron Microscope

The biggest single feature of the electron microscope is the enormous improvement in resolving power over any other form of microscopy. Resolving power or resolution of a microscope means the ability to distinguish separately two points that are very close together.

Electron beams have wave motion like light beaams and they can be bent and focused by electromagnetic lenses just as light beams are by optical lenses. However, because of the very much shorter wavelength of the electron beam its resolving power is far greater than that of the light beam, hence much higher magnifications are possible.

Since the electron beam is invisible to the eye, the eyepiece of the light microscope is replaced by a fluorescent screen in the electron microscope. Details of the object being magnified may then be examined visually on the screen or photographed directly by removing the screen.

The electron microscope therefore consists basically of a source of electrons (electron gun), electromagnetic lenses to channel the electron beam through the specimen, a fluorescent viewing screen, and a photographic attachment.

Preparation of Material

The preparation of material into a form suitable for viewing in the electron microscope calls for considerable skill and patience, and in some cases is exceedingly difficult. The main prerequisite is that the material be exceptionally thin to allow the passage of electrons. It must also be stable in a vacuum and resistant to electron bombardment. After specimens have been picked up on specially prepared grids, they may be viewed directly in the electron microscope or may first be "shadowed".

"Shadowing" consists of evaporating a heavy metal such at platinum onto the surface of the specimen at an angle. This has the advantage of in-

* Acknowledgement is made to C.S.I.R.O., Division of Forest Products, for permission to reprint this article from their Newsletter (Jan.-Feb. 1967) No. 337.

creasing contrast so that the geometrical relief of the surface is much more apparent (Fig. 1).

There are three ways in which a specimen may be prepared for viewing—direct observation, surface replication, and sectioning.

In direct observation the specimen must be first disintegrated into minute fragments, so this method has great limitations. For example, if parts of a wood fibre wall are to be examined, thin sections of wood are cut, placed in water, and then disintegrated for some time in a homogenizer. The suspension is then allowed to stand until all visible particles have sunk. A tiny drop of the apparently clear supernatant liquid is then placed on a grid and examined in the hope that minute pieces of cell-wall layers will be present. This is clearly a hit-or-miss method, but quite good results can be obtained with patience and perseverance.

Surface replication, as the name implies, limits observations to surface phenomena. A section or chip of wood is pressed tightly against a block of thermoplastic material and heated. An impression of the surface of the wood is produced on the plastic surface and the woody material is then carefully removed. This replica is shadowed with metal and carbon, then the plastic material is dissolved away leaving a very thin metal-carbon layer which is not only a faithful reproduction of the wood surface, but which is also shadowed for contrast as described earlier. Pieces of replica, 1 mm square, are then picked up on grids and can be examined in the electron microscope. Actually, only a surface impression of the material is seen, which gives no indication of what the structural features below the surface are. For this reason the method has limitations.

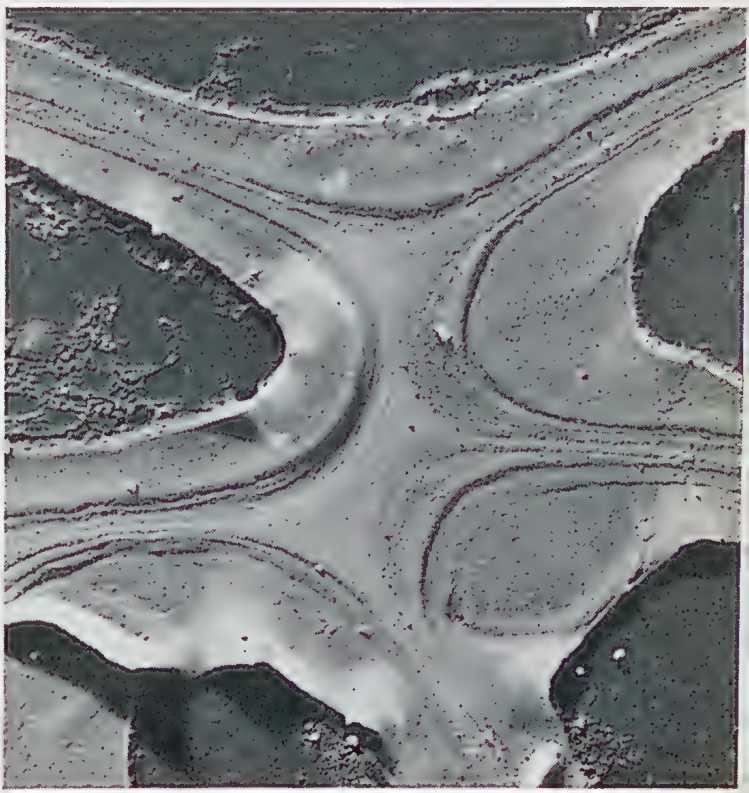


FIG. 1 — Electron micrograph of a thin section of *Eucalyptus regnans* showing the cell-wall layers at a corner between five cells. This section has been shadowed with a heavy metal. × 5000.

Surface replication has one major advantage over direct observation in that parts of the surface can be selected for examination, and much of the early research into the nature of cell-wall layers was done in this way.

Section-cutting by mechanical means has been done for many years. The instrument used is called a microtome. It works on the principle of commercial bread slicers, i.e. slices of desired thickness can be cut off and the specimen block is raised automatically so that the next slice will be of the same pre-set thickness.

Sections from mechanical microtomes can be cut as thin as about 4 microns (0·004 mm), but such sections are about 400 times too thick for electron-microscope examination. It is only in recent years that suitable ultramicrotomes have been devised that will cut sections as thin as 0·01 micron (0·00001 mm or 1/2,500,000 of an inch). The cutting is done with glass or diamond knives and the specimen block is fed forwards by thermal expansion of the block holder. The pieces of material used must be very small and in order to hold them in a suitable clamp they must first be embedded in a plastic material. Epoxy resins have been found to be very suitable for this purpose. The specimens used can be pre-stained if required, or, after mounting on grids, the plastic can be dissolved out and the specimen then shadowed with metal as described earlier.

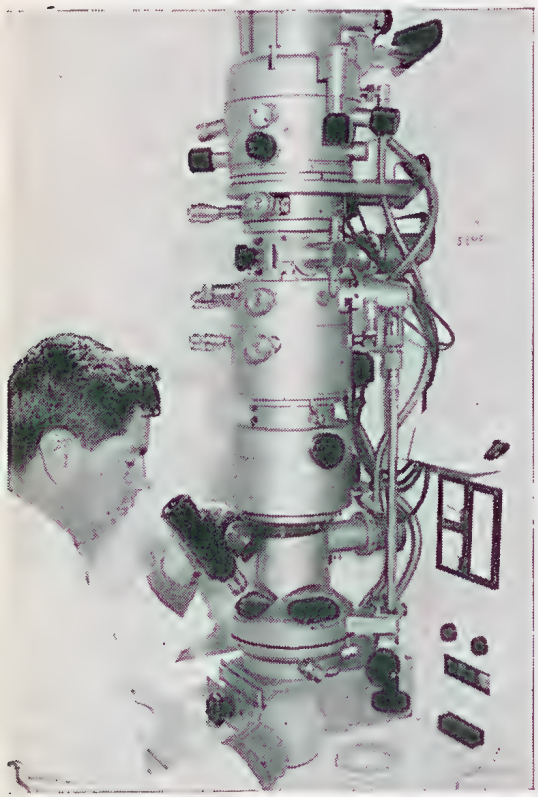


Fig. 2—The Division's electron microscope. The specimen is inserted near the top of the instrument and is viewed through the telescope at the base. The camera is below the viewing screen.

This technique of ultra-thin sectioning opened up new fields to the electron microscopist, making it possible to examine the fine structure of the cell wall across its entire thickness. Also, suitable fixatives were found so that the cell contents, or cytoplasm, could be "fixed" or permanently preserved in a condition closely approximating to that of the living material. As may well be imagined, these new methods have been of tremendous value in all fields of research.

Role of the Electron Microscope in the Division's Research

The Division has had two electron microscopes and much of the early work on lignification and cell-wall structure was done with the original instrument using replica and direct observation techniques. Since the installation of a Siemens Elmiskop (Fig. 2) about seven years ago, further advances have been made in the above fields and our knowledge of numerous anatomical features has been improved

by the ability to cut ultra-thin sections on Siro-flex ultra-microtomes.

Many topics of interest to industry have also been investigated. Using the knowledge gained from the fundamental studies mentioned above, it has been possible to carry out research into pulp and paper properties, timber fracture, plywood gluing, liquid penetration into wood, tannin formation, mycorrhizal associations, and other related fields.

It must be realized, of course, that the high resolution of the electron microscope is far from being the complete answer to all the above problems. In the field of lignification, for example, the knowledge of chemists is of absolute importance in the interpretation of electron micrographs, because it is essential to know the possible shapes, sizes, and arrangements of lignin particles before many of the visible features of lignified and delignified wood can be explained. The main advantage of the instrument is that we are now able to see objects approaching macromolecular size, and to use this visible evidence in conjunction with physical and chemical evidence in the formation of hypotheses to account for the structure and function of both animate and inanimate objects.

Book Review

Hambridge Wild Life Reserve

(A Survey by The Nature Conservation Society of South Australia)

An area of 93,865 acres of low rainfall, unspoilt country in central Eyere Peninsula was proclaimed "Hambridge National Park" in 1967. Prior to this in October, 1966, twenty members of the Nature Conservation Society of South Australia made a survey of the region covering fields of soil science, botany, zoology, ornithology, mapping and photography.

This thirty-two page booklet is a report of the results of the three-day survey, including lists of all species seen.

Printed on good quality paper with ten plates. it is a valuable contribution to our knowledge of this type of country and anyone visiting the area should not fail to obtain a copy from the publishers: Field Naturalists' Society of South Australia (Inc.), Box 1594 M, G.P.O., Adelaide. South Australia, 5001.

A Field Guide to Victorian Wattles

by F. J. C. Rogers

This pocket-size book, prepared by a member of the Ringwood F.N.C. will be an invaluable asset to the rambling naturalist. It contains descriptions of 83 species with 80 excellent black and white illustrations by John Truscott. Hints are also given on the germination and cultivation of wattles, *Price,* $1.50 from 108 Wantirna Rd., Ringwood.

close to nature

by G. M. WARD

How many of us realize just how close we are to nature; and with what little effort it can be studied?

From the fluttering moth at a lighted window, to the spiders in the darkest corner of our garden shed; the wonders of the world are numerous—to the careful and patient observer!

This is a series in which a look is taken at some of these creatures which make up this "world in the garden". The aim is not to provide a completely scientific treatise in each subject; but rather to provide enough general detail to stimulate an interest in the things around us.

If the series encourages us not only to look; but to see something in what we are looking at, then it will have served its purpose.

This month, we shall rely mainly on photographs to introduce the subject. Most readers will probably recognize the adult Wanterer Butterfly in the lower picture, but all may not have seen the other stages in the life cycle.

The Wanderer Butterfly (*Danaida plexippus* L.), is originally a native of North America, but has spread almost all over the world. It appears to be quite at home in Australia. The host plants of the banded and tentacled larvae are Milk weeds; and the butterfly itself has apparently no natural enemies in Australia. Birds seem to show no interest in it, perhaps because of the taste.

FIG. 1. The brightly coloured larva showing tentacles.

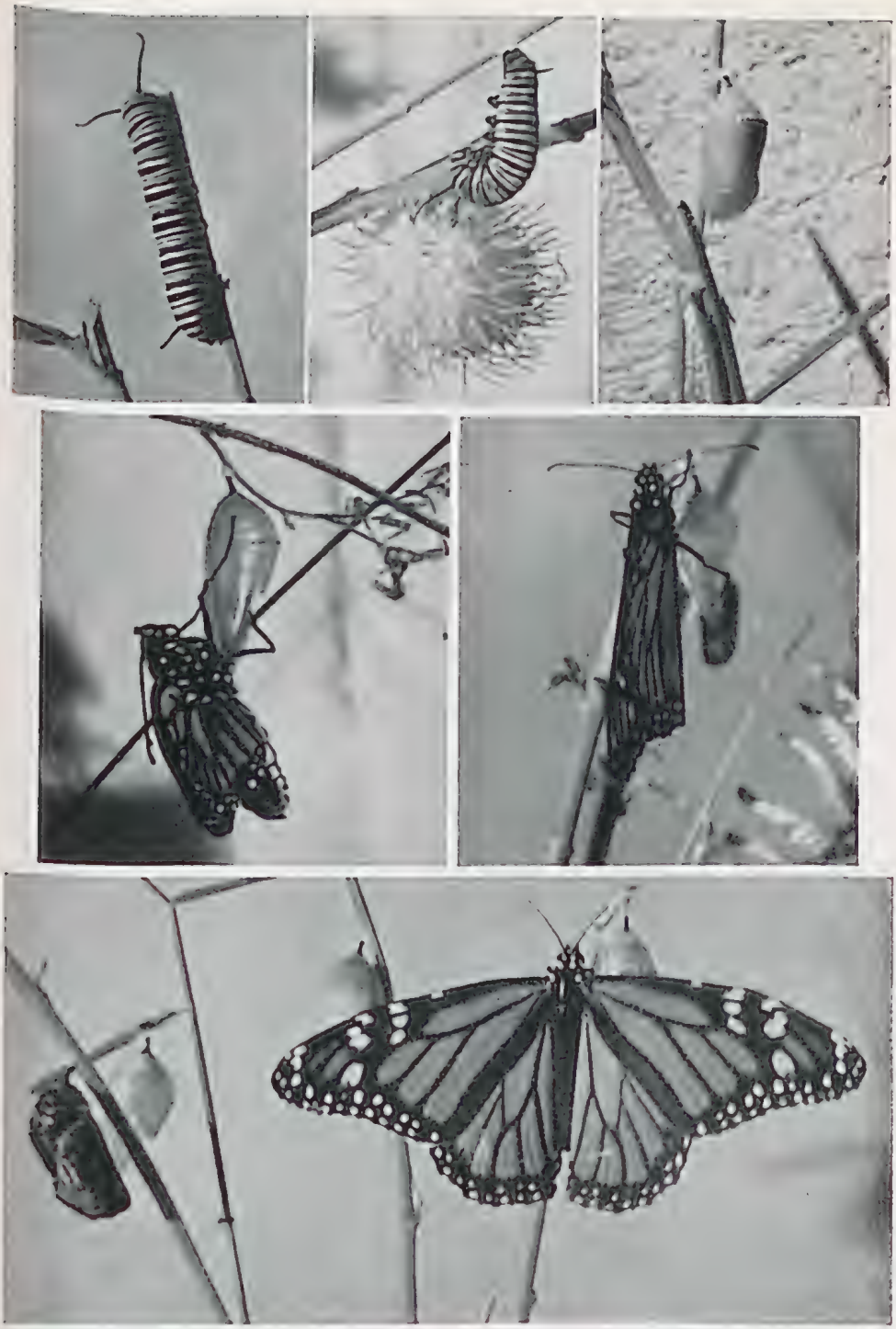
FIG. 2. Larva hanging head down prior to pupation.

FIG. 3. The beautiful jade green pupa show the golden spots.

FIG. 4. The emergent butterfly with wings crumpled.

FIG. 5. With wings dry, the adult prepares for flight.

FIG. 6. The splendid, showy insect—the climax of the life cycle.



Photographs—Letitia Maynard.

Figure Captions, p. 258.

A Record of a Coat Colour Variant in the Marsupial Mouse, *Antechinus swainsonii* (Waterhouse, 1840)

by JOAN M. DIXON*

In a current survey of mammal species in the Otway Ranges, the author has trapped in a number of localities. The main sites are at Gellibrand River, Wyelangta and areas close to the Upper Aire River. A number of mammal species have been recorded including two species of *Antechinus*, namely *A. swainsonii* and *A. stuartii*.

This note concerns the specimens of *Antechinus swainsonii* which have been collected at Gellibrand River. They comprise four females and one male, all trapped in Sherman collapsible aluminium traps baited with a peanut butter, honey and oatmeal mixture.

Coat colour in all but one of the specimens collected in this area is remarkably constant, the fur being a deep yellow-flecked chocolate brown. The one aberrant specimen, a female, differs markedly in coat colour from normal specimens (Figs. 1 and 2). Throughout the general body hair and extending down the tail are long white guard hairs. The overall appearance of the dorsal body hair is a grizzled grey-brown. On the face there are two symmetrical areas of white fur, each extending dorsally backwards from a position approximately level with the mystacial vibrissae, around and in front of the eye, then meeting the band of the opposite side just anterior to the bases of the ears. This white fur extends to a position just behind the ears where it changes to the grizzled coat colour. The ventral or undersurface of the body is grey-white. Eye pigmentation and granulation of foot pads appear to be normal.

* Curator of Vertebrates, National Museum of Victoria.

FIG. 1. Front view of coat colour variant of *Antechinus swainsonii*.
← *photo*: J. Brownlie.

FIG. 2. Side view of coat colour variant of *Antechinus swainsonii*.
photo: J. Brownlie. →

As far as I am able to determine, this piebald variant is a unique record for *Antechinus swainsonii*.

The following observations have been made on the habitat of the species at Gellibrand River. The basic rock of the area is basalt of the Older Volcanic Series. The eucalpyts, Messmate (*Eucalyptus obliqua*), and Manna Gum (*E. viminalis*), form an open canopy. Other species of the tree layer are Tree Everlasting (*Helichrysum dendroideum*), and Blackwood (*Acacia melanoxylon*). The shrub layer is light and there are numerous moss-covered fallen logs, Bracken (*Pteridium esculentum*), and Fishbone Fern (*Blechnum nudum*), which provide useful shelter for *A. swainsonii*. Clumps of Tussock Grass (*Poa australis*), and Wiregrass (*Tetrarrhena juncea*), enclose small runways which also provide cover for numerous *Rattus fuscipes assimilis*.

Acknowledgements

Thanks are due to Mr. J. Clancy, of Gellibrand River, who has allowed me to trap on his property on a number of occasions. Miss H. Aston, Senior Botanist of the Royal Botanic Gardens and National Herbarium has kindly assisted with determination of plants of the area.

References

Wakefield, N. A., and *Warneke, R. M.*, 1963. Some Revision in *Antechinus* (Marsupialia) 1, *Vict. Nat.* **77** (1).

Phillips, Carleton J., and *Wilson, Nixon*, 1965. A partially Albino Bandicoot from New Guinea. J. Mamm. **46** (4): 698-699.

Andrews, A. P., 1968. Some recent Mammal Records from the Lake Pedder Area, South-West Tasmania. *Proc. Roy. Soc. Tas.* **102**: 19.

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Reminder to Country Club Secretaries

Please make sure of ordering your supplies of *Flowers and Plants of Victoria in Colour* from the F.N.C.V. to ensure discount to members.

Notice from R.A.O.U.

We know little in Australia about migration routes of animals. The Royal Australasian Ornithologists Union is conducting an Individual Observation Point scheme to find out more about the migration and other movements of our birds. Amongst other things, it is hoped to clarify some aspects of trans-Bass Strait migration. This survey calls for regular observations, but is neither difficult nor terribly time-consuming. The Survey convener, Mr. D. G. Thomas of 2 Lallaby Road, Moonah, Tasmania 7009, would be pleased to hear from observers who know the birds of their district, whether they are R.A.O.U. members or not. Obervers are sent regular newsletters, and the first annual Report has been published in the *Emu*. The Scheme covers Victoria, Tasmania and the A.C.T.

Wanted

The Headmaster of Oakleigh State School has advised that the school F.N.C.V. miscroscope, from which they have had valuable service, was stolen along with other equipment recently. He therefore wishes to replace this instrument, and asks if any member can help in this request.—N. A. Coundall (Act. H.M.)

Morphological Variations in Victorian Tortoises

With special referance to the intermediate form of Chelodina expansa

by JOHN GOODE*

Many of the variations that occur in the morphology of different forms of fauna at different stages in their growth are now well known, as are details of sexual dimorphism. That this was not so readily recognized in the past is evidenced by the number of type specimens of juveniles or non-mature Australian tortoises on which species descriptions and names have been based and which bear little resemblance to the adult of the species or the majority of specimens now known.

With the Chelidae of Australia and New Guinea, this failing was typified by some remarks of Dr. J. E. Gray of the British Museum (Natural History) in his later years. When commenting in 1870 on the species which he named *Elseya dentata* (based on two immature syntypes) he wrote:

> . . . the dentated form of the margin is only a peculiarity of the younger state of the species; and therefore the specific name is not one that I should have chosen if I had had the adult form of the species before me when I selected it.

Even with our present knowledge of the Chelidae of Australia and New Guinea, hardly any species are known in every representative size from hatchling to mature adult and in both sexes.

Of the Victorian species, a surprising number of differences and similarities occur in the morphology between individuals of the same species at different stages of their growth and between different species of the same or related genus.

* 12 Roberts Street, Frankston, Victoria 3199.

The three species of freshwater tortoises occurring in Victoria are *Emydura macquari* (Cuvier), *Chelodina longicollis* (Shaw) and *Chelodina expansa* (Gray). *E. macquari* is representative of one group of the short-necked tortoises in the Chelidae and *C. longicollis* and *C. expansa* respectively represent groups A and B of the three groups of long-necked tortoises found in Australia (Goode 1967, Burbidge 1967).

Emydura macquari (Cuvier)—the Murray Short-necked tortoise. The morphological changes recorded in the various sizes of this species can be roughly divided into three.

(a) Hatchling, 24-33 mm (0·94-1·3 in.), carapace length to 130 mm (4-5 in.): Carapace roughly circular in shape, marginals dentated, vertebrals strongly keeled.

(b) Intermediate, 130 to 230 mm (5-9 in.) carapace length: Carapace becomes elongated, considerably expanded at rear. Rim becomes smooth, shell becomes deeper with maximum depth occurring about one third its length from the front, the carapace then falling away rapidly to the posterior margin. Throughout this stage, the vertebral keeling diminishes with growth until, at 230 mm, it is not present.

(c) Adult, exceeding 300 mm carapace length: Carapace depth extends to give maximum depth almost constantly from one-third to two-thirds of its length. The posterior of the shell is still broad but the anterior half of the carapace has also broadened to give a width in front almost equal to that behind.

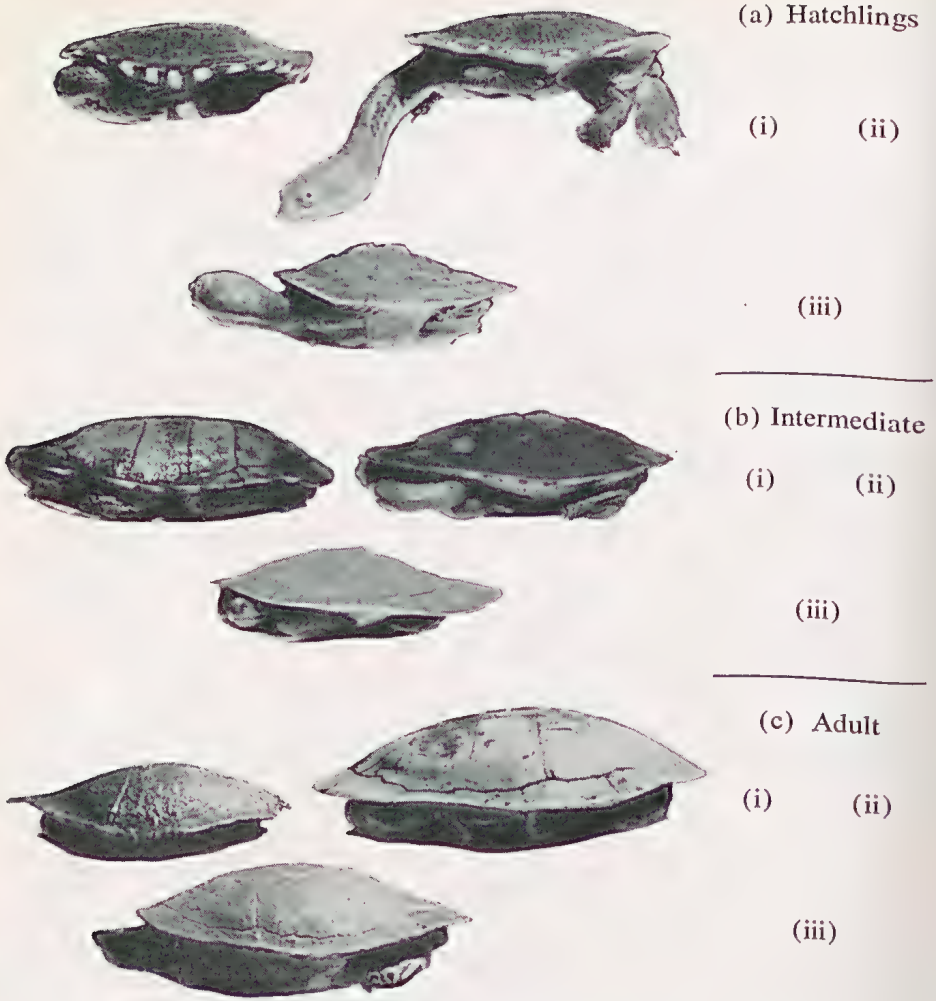

FIG. 1. Lateral View—(i) *C. longicollis*, (ii) *C. expansa*, (iii) *E. macquari*.

Chelodina longicollis (Shaw) — Australian Snake-Necked Tortoise. With many tortoises, indeed many forms of fauna, colouration is variable and hatchlings may exhibit markings of shell and skin which differ markedly from the adult. In *C. longicollis*, the plastron of the hatchling is mostly black with small red or orange spots in the centre of each plastral shield. There is a similarly vivid stripe running from the corner of the jaw, back along both sides of the long neck. As the tortoise increases in size, the black on the plastron recedes to form, eventually, the conspicuous dark shield margins which typify the plastron of the intermediate and adult form. The red bleaches in a matter of months (or less) and eventually fades to the bone colour of the adult plastron.

However, with the exception of colouration, the morphological form of the hatchling is remarkably similar to the full-grown adult. There is no indication of vertebral keeling, and the

raised margin above the tail is present at hatching. The only remarkable changes in the morphology of *C. longicollis* as it increases in size are the development of a vertebral groove (the hatchling has a rounded carapace) and the upward curling of the lateral carapace edge similar to the brim of a bowler hat.

Because *C. longicollis* changes so slightly in form during its life span, it could be considered as a classic example of morphological conformity.

Chelodina expansa (Gray) — the Broad-shelled Tortoise. This species could be said to be typical of group B long-necked chelid tortoises (see Goode 1967, Burbidge 1967). The morphological changes recorded in the various sizes may, like *E. macquari*, be divided into three.

(a) Hatchling, 40 mm (1·5 in.) to (?) carapace length: Carapace roughly triangular with considerable expansion at rear. Shell is shallow, marginals slightly overlapping but give a less conspicuously "serrated" appearance than *E. macquari*. The shell is rounded with no trace of vertebral keels. Undersurfaces of hatchling and all

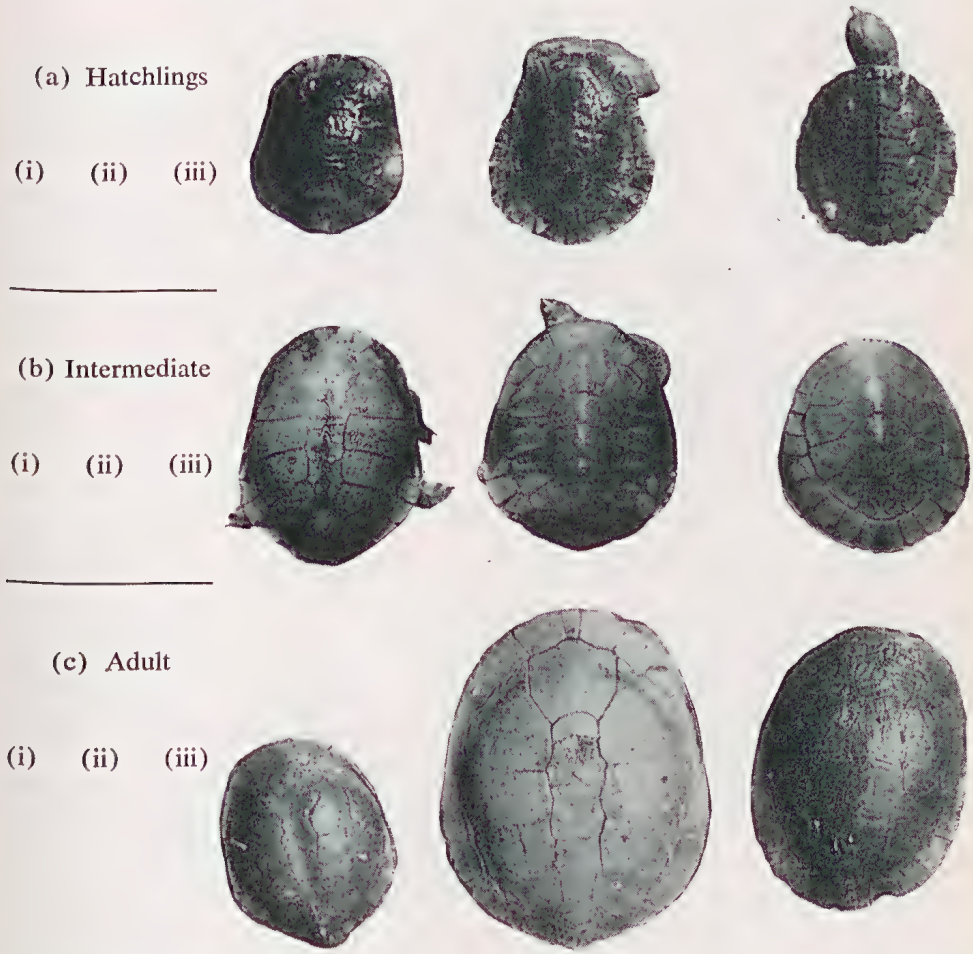

FIG. 2. View from above.

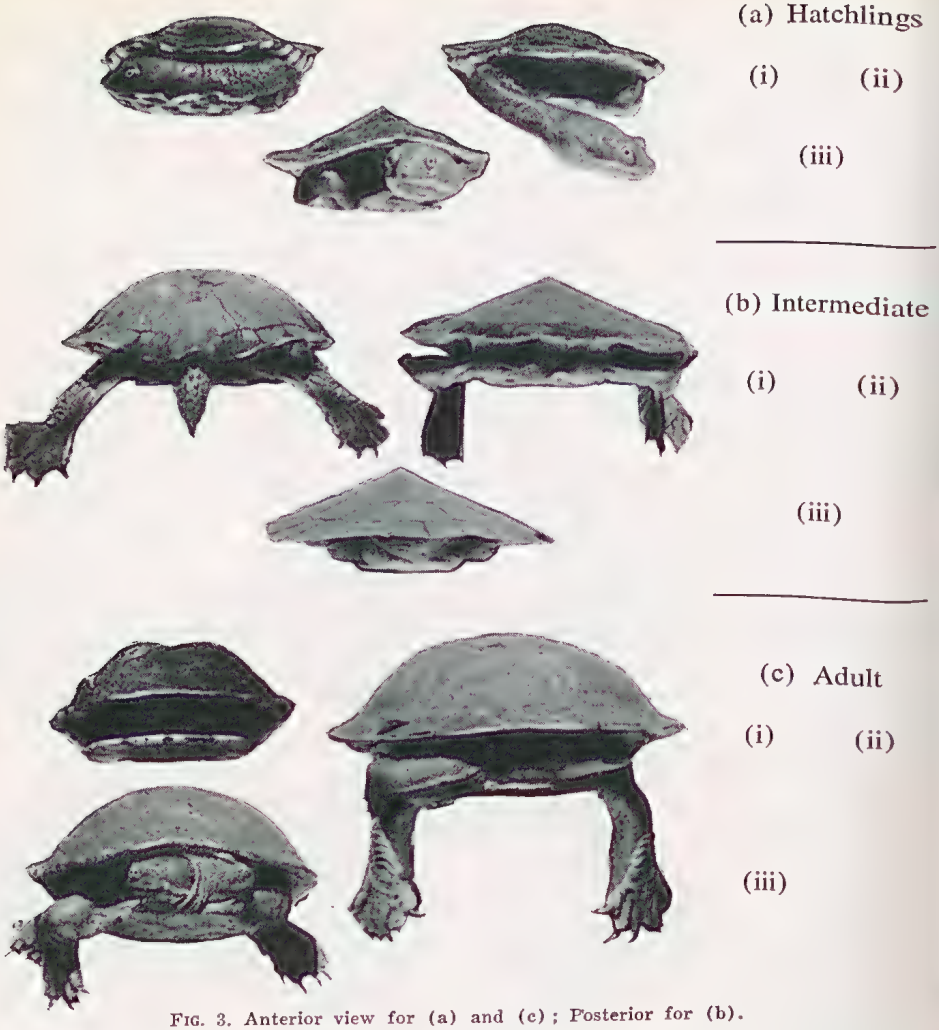

FIG. 3. Anterior view for (a) and (c); Posterior for (b).

subsequent stages are always ivory, unmarked by any dark patches.

(b) Intermediate, 140 mm (5·5 in.) carapace length: Carapace considerably expanded at rear, prominent vertebral keels, carapace rim smooth, carapace deep, triangular when viewed from front or back.

(c) Adult, exceeding 230 mm (9 in.) to 423 mm (16·5 in.) carapace length. Carapace expanded at rear, but far less wide than anterior half in larger forms. Shell very deep, rounded in cross-section and with no trace remaining of vertebral keeling. On largest specimens, slight trace of vertebral groove. Shell depth and anterior breadth increase with size.

From these descriptions and the Figures illustrating all three species at various stages in their growth, it will be seen that the intermediate form of *C. expansa* possesses a carapace shape closer in form to *E. macquari* than *C. longicollis*. Of course, the non-marginal intergular shield, the narrow

plastron and other distinctive taxa leave an observer in no doubt that this specimen is *C. expansa* and, in fact, a hatchling kept confined and underfed for three years is showing incipient development of the triangular carapace cross-section and vertebral keels, even though its size has not increased more than 50-60 per cent above that at hatching.

While comprehensive collections of intermediate sized specimens of tortoises in group B *Chelodina* are not available, intermediate sized specimens of *Chelodina siebenrocki/rugosa* (?) have shown no trace of vertebral keeling; neither has the group C *Chelodina* species, *C. oblonga* (see Burbidge 1967), in most ways similar to group B, except for the presence of neural plates, ever been seen with traces of vertebral keeling.

The incidence of vertebral keeling in short-necked species of the Chelidae (with the exception of *P. umbrina*) is constant in all species known, both in the genera *Emydura* and *Elseya*. However, *C. expansa* would appear to be the only long-necked tortoise to possess vertebral keels, and then only during its intermediate stages of growth.

The significance of this factor is hard to assess. It could possibly be argued that this similarity at this stage between the shell morphology of this single long-necked species and all short-necked species might indicate that *C. expansa* represents a later (or earlier) link with the original but unknown ancestors of all Chelid tortoises in Australia and New Guinea. On the other hand, the consistency of taxa in *C. expansa* with all other tortoises in the genus *Chelodina* and not with short-necked tortoises leaves no doubt that this tortoise is correctly located in its genus and that the presence of vertebral keels in its intermediate form represents something in the phylogeny of this species which has either been lost, or is not yet developed, in all other species as they are now known in *Chelodina* groups A, B and C.

The lesson from these observations are commonplace to scientsts and amateurs in areas where tortoises are common and easily obtained, throughout all stages of their growth, and for both sexes. But in many areas of Australia and New Guinea, where the range of morphological variations is more often unknown than known, it confirms that descriptions of new tortoise specimens should be confined to the range collected and this should be clearly stated so that much of the confusion of the past can be avoided in the future.

References

Burbidge, A. A., 1967.—Evolution of the Chelidae in Australia and New Guinea. *The Biology of South-Western Australian Tortoises.* Unpublished Ph.D. thesis, University of Western Australia.

Goode, J., 1965.—Freshwater Tortoises in Victoria. *Vict. Nat.* **82**: 169-175, 5 pl.

Goode, J., 1967.—*Freshwater Tortoises of Australia and New Guinea.* Lansdowne Press, Melbourne, Australia. 154 pp., 139 pl., 8 figs.

Gray, J. E., 1863. *Chelymys dentata* sp. nov. *Ann. Mag. Nat. Hist.* (3) **12**: 98.

Gray, J. E., 1870. *Supplement to the Catalogue of Shield Reptiles in the British Museum,* London 1: 77.

A Tribute to W. Lloyd Williams

(Block by courtesy of Education Dept.)

When W. Lloyd Williams was elected Presdent of the F.N.C.V., we who knew him knew he would not only exemplify the best traditions of the club, but also bring to the presidency special qualities of his own. This made it all the more distressing when the progressive effects of multiple sclerosis made it necessary for him to resign a few months later, and ended in his death on July 8th.

It is little over six months since, after speaking briefly of the inexorable progress of the disease, he wrote to me, "I am a little sad, but not peeved —for I have had a wonderfully happy and enjoyable life".

Those who give most receive most, and Mr. Williams gave more to life than most of us. It is a misfortune for many that he was not president long enough to enable most members of the club to know him well, and perhaps, for that reason, some reference to his life outside the club is desirable. It was a full life indeed. As teacher, writer, editor, broadcaster, naturalist, conservationist, scoutmaster and commissioner, and historian he has left work that will be remembered.

He was rarely able to take an active part in the work of the Field Naturalists Club (though a member for many years) until after his retirement from the Education Department in January 1966, after an association with it which began in 1920.

He left the Teachers' College as Master of Arts, Diploma of Education and winner of the Dwight Prize in Education, and then began the 15 years of High School teaching that ended in his appointment as Assistant Editor of Publications in 1935.

Of those years of teaching a story was told when he retired of "a chance encounter with a former pupil of his who told how the class just hated the bell to ring when, draped casually over a front desk, he was talking about, or reading to them some passage or verse of which he was particularly fond".

The words bring to mind a picture of the informal Assistant Editor as I first met him soon after his appointment. We had both contributed to the *School Paper* for years, and I remember with what pleasure I met the author of *Red Correa* and other poems, and articles on Victorian orchids.

In 1941 he was appointed Editor of Publications, editing the *School Paper* and *Education Gazette*. Later he founded, and edited, the *Educational Magazine* with its delightful humour and its articles on a range of subjects as wide as the interests of teachers which is almost infinite. Amongst these was the cause of nature conservation for which he did much. A minor illustration of this was a request I remember for "a series of about 12 articles on threatened wildflowers under the general title *"Beauty in Distress"*.

During those years he wrote much for the papers he edited and for the *Victorian Scout* from which his series *Your Trees* and another, to which he (and many of our fellow-members) contributed, on *Our Birds* were reprinted as the booklet *Feathers and Foliage*, subtitled A Scout's book of Birds and Trees.

He was then Scout Commissioner for Hoadley Country and wrote in his introduction to the book—

"I glance from the window into the streets of the city. If God were to forsake this place I shouldn't blame Him much, for in the noise of trams and cars—the streets—there isn't a great deal of natural beauty. But He hasn't. A shadow flits across the brick wall, and another, and another. Three pigeons have wheeled over in the sky above . . There is a sudden flash of crimson and blue, a georgeous Crimson Rosella . . . a twittering . . . four or five finches. Even the busiest parts of the city are not without their birds".

On a different theme, indicative of the breadth of his interest, was the book *History Trails in Melbourne*, telling the history of some of the city's older buildings; on yet another the children's book *The Silver Bone* over which an adult can chuckle appreciatively.

His articles in the *Victorian Naturalist* were usually about orchids, especially about unusual forms which especially interested him, but there were others. Few who read it will forget his account of the overnight flowering of the lovely Pradu tree,* written during 18 months spent in Bangkok at the request of UNESCO, when he established an educational publications programme for South-east Asia. The experiences of those months came very pleasantly to readers of the papers he was associated with during succeeding years.

There was a charm about both his

* The Pradu Tree, *Vict. Nat.*, May 1968.

speaking and writing, which those who knew him will long remember. I recall appreciative remarks about this by Professor Charles Hartshorne who shared one of the Toolern Vale Bird Day outings in which Mr. Williams took an active part.

Amongst work that endures as a memorial to him are two books of poems from *The School Paper* — *Australian Verse for Children* and *More Australian Verse for Children.*

There are good things there from many writers, but among the most memorable are poems by the Editor —the poignant *Beside the River,* the gently amused *New Year Resolutions of a Boy*, and *He and I*—are a few of them. The last must appeal to all naturalists.

". . . If he could take a ferny track to school,
And see the flitting of a blue-bright wren,
Among the pink-eye all along the way—
There'd be no wars, I think, when we were men.
If I could walk on needles soft and brown,
Beneath the forest pines awhile, and then
Go down into a valley filled with farms—
There'd be no wars, I know, when we are men".

When he retired Mr. Williams was wished "many years to enjoy the roads he has enjoyed travelling". He did not have them, but one can still take comfort from the words "I am not peeved—for I have had a wonderfully happy and enjoyable life".

Perhaps part of the secret of that happiness is expressed in another quotation from his introduction to *Feathers and Foliage.*

"It is not merely a business proposition, this preservation of birds. Anyone who has had a Yellow Robin or a Grey Thrush perch on his hand while it fed from scraps in the palm, has had an experience that he will not soon forget. It has happened to me. It can happen to anyone who will cultivate the gifts of patience and of stillness. The bright eyes, the cocked head, the clasping feet, the rustling wings will stay with you . . . All at once, when it is Melbourne or grey winter, you will remember them, and for you it will be spring again and there'll be bush and sunlight about you. That's how it is with me, anyhow. And as I wrote somewhere else and long ago I'm not at all sure that that is not what birds were made for".

JEAN GALBRAITH

[Grateful acknowledgement is made to the Education Dept., and Scout Headquarters for permission to publish extracts from *The School Paper* and *Feathers and Foliage.*]

Field Naturalists Club of Victoria

General Meeting—12 August, 1968

There were about 200 members and friends at the meeting chaired by the President, Mr. E. R. Allan.

The President recommended that Miss Mary Bull, who has been a member for 40 years, be made an honorary member of the Club. In supporting this, Miss M. Elder said that Miss Bull came from England as a young teacher and was earlier a keen member and a good botanist who says she owes much to the Club.

Miss Jean Blackburn endorsed the recommendation.

Mr. D. McInnes appealed to new members to assist with the coming Nature Show. He thanked Mrs. K. Hough, Mr. Len Robinson, Mr. Campbell and Mr. Kenyon for their help in the preparation of the leaflet advertising the Show, and Mr. T. Byrne for translating it into Italian. He said that the Club is indebted to the Ingram Trust for finance for it.

Bundles of leaflets were given out to be circulated to schools, etc., and big notices for notice boards, together with car stickers.

The Secretary read a letter from the Town Clerk announcing that$44 would be charged for the occupation of the Lower Town Hall on the Sunday of preparation, in addition to the charge for the Show.

The subject for the evening was "Birds", by Mr. Roy Wheeler. Mr. Wheeler said that he had recently lectured and shown the pictures to more than 2,000 children in Gippsland districts. He said that recognition of birds depended on colour, song, size and habits. He illustrated the talk with magnificent colour slides projected by Mr. Morrison.

Over 100 species were shown illustrating colour (red, yellow, green, blue and pink) in birds, distinctive song, outstanding size, characteristic eggs, nests, camouflage, methods of feeding, differences in sex and mature and immature birds, birds of the tides and of swamps, those that nest in colonies, blossom and insect feeders and carnivorous birds, and different patterns of flight.

Mr. Wheeler stressed the appeal to world tourists of the march of the Fairy Penguin. He warned of the danger to the Lyre-birds by packs of dogs. Six birds had disappeared from Sherbrooke this year.

He said that Mr. Woollard had asked for a list of the birds of the Dandenongs. He had now prepared a list and he presented it to Miss Jean Woollard for the Club.

The President thanked Mr. Wheeler for his most interesting talk and the pictures (over 100 of them) and he said that the Dandenong bird list was a very fine gift to the Club. He believed Council would want it duplicated. It will be valuable for all who go to the Dandenongs.

He stressed the problem of keeping the habitat of the birds. We should each plant one tree ourselves to try to replace the trees being taken down.

Mr. McInnes suggested that the money left to the Club by Mrs. Lewis could be used for this list.

The publication of a new book — A Guide to Victorian Wattles, by F. Rogers of the Ringwood Field Naturalist Club— was announced.

Mr. J. Quirk spoke of a leaflet from England from "Beauty Without Cruelty" organization which is opposed to the use of cosmetcis and wearing apparel obtained from the slaughter of animals. He mentioned the clubbing to death of seal pups on the coasts of Canada for high quality fur coats.

Mr. Allan reminded members of a film produced in the 1940s against cruelty to egrets which had moved public opinion and so stopped the practice of collecting their feathers.

A proposal to build a "Marina" Hotel at Rhyll, Phillip Island, would involve the destruction of the feeding ground for many water fowl. It was suggested that a letter of protest be sent to the Phillip Island Council and the Town and Country Planning Board.

The Secretary read a letter from the Doncaster and Templestowe Tree Preservation Society inviting representatives of the Club to attend a meeting to discuss the proposal for a Warrandyte National Park, including the Pound Bend and Jumping Creek area.

The Lands Department is considering disposal of much of its land and there is an application by the Warrandyte Council for part of the Jumping Creek land to be used as a golf course. The Minister has admitted that consideration is being given to the application.

It was suggested that Mr. J. W. Manson

be written to, letting him know the views of Club members that it should be a national park or reserve for everyone to enjoy.

Mr. Lewis said it is an area of bushland which could quite well be set aside as a park.

The Secretary also announced the formation of a Wytchitella Forest Preservation League. The President and Secretary will go on 30th August to inspect the area.

There is a Club weekend to the area on the third weekend in October.

Nature Notes. Mr. A. J. Swaby showed a piece of wood from the wood heap with fine dots in rows which may be a disconnected fungus. The C.S.I.R.O. revealed that such a white rot is known on Douglas fir which is admired for decoration.

He also showed a piece of bark from a Coranderrk bushland tree having a brown appearance—probably a fungus.

Gary Barres showed two beetles embedded in resin by a process requiring less effort than the usual one.

A large fish-eating bug, *Lethocerus indicus,* from Landsborough, Queensland, was shown. Mr. Curtis referred to Graham Pizzey's article in the Herald on Centipedes and asked for information on the feeding habits of centipedes.

A discussion was held deploring an application to lease roads and banks of streams in the Ovens River, Eurobin Creek and Falls area from the Department of Lands. The Council will consider what action can be taken.

Mrs. Meehan asked if lions in a new zoo in N.S.W. will be fed on kangaroo meat. Mr. Allan will inquire.

Mr. R. Taylor said that the proposal to make a coast road along the East Gippsland coast would involve excessive clearing and mean a great deal of destruction of the habitat of such birds as the rare ground parrot. He said Mr. Hamer had promised that an ecological survey of the area should be taken.

Mr. Taylor proposed that this meeting authorize the Council to give support to a National Parks Association proposal that, instead of a coast road, tracks should be run in from the Princes Highway to selected points on the coast. This was seconded by Miss Woollard and carried. It was suggested that members write to Mr. Hamer asking that this alternative to a coast road be considered.

The Secretary contrasted the little money spent on national parks with the proposed millions for the coast road.

Mr. J. Baines introduced a valuable new "Field Guide to Victorian Wattles", by F. J. C. Rogers, containing descriptions and illustrations of 80 species ($1.50). He also showed a copy of "Australian Flora in Colour"—Plants and Flowers of Victoria.

The Secretary showed a booklet, "The Case for a Lower Glenelg National Park", prepared by the Western Victorian Conservation Committee ($1.50). This committee requires help in their efforts against alienation of part of the Lower Glenelg. It would be helped by sending $1.50 for the booklet to Mr. F. Davies of Portland.

Marine Biology and Entomology Group, 1 July, 1967

This meeting was attended by 21 members, and was chaired by Mr. Condron.

The secretary reported that he had contacted the Fisheries and Wildlife Department re obtaining the loan of a female Lyre-bird for the forthcoming Nature Show; unfortunately they were unable to help us. Mr. McInnes will contact the Secretary, B.O.A.C., to see if they can be of assistance.

General Business:

Dr. Brian Smith, Curator of Invertebrates, National Museum, has kindly offered to arrange a display of shells for the forthcoming Nature Show, and arrange for transport of same to and from the Museum.

Guest Speaker for the evening was Mr. H. B. Wilson, Senior Entomologist, Burnley Horticultural Gardens, his subject being "Wood Borers". Mr. Wilson described the composition of wood, and went on to say that there were approximately 3,000 species of wood-borers, comprising beetles, termites, bees, wasps, moths, cockroaches and ants, the latter not being found in Australia. With the aid of a blackboard Mr. Wilson described and drew diagrams of several of these species, some of which were introduced, and some indigenous to Australia. Different methods of boring were described, and Mr. Wilson said that most of the local borers were nocturnal. Diagrams of the jaws of various species were illustrated by excellent drawings. The lecture created much interest among members, who voted it a most informative talk. At its conclusion many

questions were asked, and a vote of thanks to Mr. Wilson was moved by Mr. K. Trotter.

Exhibits:

Mr. K. Trotter showed several slides under his microscope, including the foraminifera *Tentorus baculatus*, commonly known as "Star Sand" which is fairly common in some parts of Queensland. Also a slide showing the ossicles, in situ, of a species of Holothurian.

Mr. Strong showed under a stereoscopic microscope, a live marine Armellid worm (species unidentified), to show its irridescence.

Miss White showed a species of the Great Water Bug.

Mr. K. Strong showed the mandibles of a very small marine worm, which he had obtained from a very small piece of Galeolaria.

Mr. Condron showed several cabinet draws of Australian and American moths.

Botany Group meeting—8 August

Eighteen members attended and Mr. B. Fuhrer presided. The evening took the form of a members' night. Mrs. E. Webb-Ware showed colour slides taken during her recent visit to New Zealand. The scenic highlights of the Southern Alps, of mountain peaks, glaciers, lakes and rivers, culminating in the glories of Milford Sound, were supplemented by many photographs of the rich flora. These included Giant Buttercup (the so-called Mount Cook "Lily") (*Ranunculus lyallii*), Mountain or Snow Totara (*Podocarpus nivalis*) representatives of the many New Zealand species of *Hebe* and *Parahebe*, of *Epilobium*, *Cordyline* and *Celmisia*, as well as several beeches (*Nothofagus*). One very attractive shot was of Karaka drupes, the fruits of *Corynocarpus laevigatus*.

Miss M. Lester, assistant librarian, F.N.C.V., showed several botanical books available in the library. She brought them before the notice of members because she had found them full of interest and lavishly illustrated. Most value could be obtained from the books (by various authors) if read in the following order:

"The Secret Life of Flowers", "The Wonderful Life of Flowers", "The Plants" (one of the Nature Library series of "Life"), and "Botany".

Both speakers were thanked by the Chairman on behalf of members.

Mr. Fuhrer, one of the photographic editors of the magnificent new colour book, "Flowers and Plants of Victoria", and Mr. J. A. Baines both had advance copies of this book on view, and these were enthusiastically examined by members. Mr. Baines also referred to the publication that day of "A Field Guide to Victorian Wattles", by F. J. C. Rogers, an excellent and comprehensive book covering over 80 *Acacia* species, nearly all illustrated by clear line drawings. The first of these books is available from the club itself, and in the bookshops from early September, and the other direct from the author at 108 Wantirna Road, Ringwood.

Future Botany Group meetingss

Thursday, 12 September — Mr. J. H. Willis.

Thursday, 10 October — Miss L. M. White.

Errata

(*Vict. Nat.*, August issue, page 241).

Some unfortunate printers' errors in the Botany Group report should be corrected.

Line 4: The title of Miss Galbraith's talk was "Flora of Tasmania".
„ 17: *Richea*.
„ 26: *Richea*.
„ 28: *Pentachondra*, *Trochocarpa*.
„ 29: *Dracophyllum*.
„ 42: specimens.

July (New Members)

(a) *Ordinary*:
Mrs. R. G. Tilley, Flat 14, 226 Dandenong Road, East St. Kilda, 3183. (Interests—Marine biology and Entomology.)
Miss Isabel Forrest, Flat 14, 18 The Avenue, Parkville, 3052. (Interests—Geology and Botany.)
Mrs. Joan Law-Smith, Flat 14, 54 Anderson Street, South Yarra, 3141.
Mr. K. A. Cherry, 49 Surrey Road, Blackburn, 3130.
Mr. C. A. Monson, 66 White Street, Mordialloc, 3195. (Interest—Insect life.)
Mr. R. S. Tumman, 12 Durham Road, Surrey Hills, 3127.

(b) *Junior*:
Mr. D. A. Middendorp, 20 Reynolds Parade, Pascoe Vale South, 3044. (Interest—Mammal Survey.)

F.N.C.V. DIARY OF COMING EVENTS

GENERAL MEETINGS

Monday, 9 September—General Meeting at National Herbarium, The Domain, South Yarra, commencing at 8 p.m.

1. Minutes, Reports, Announcements.
2. Correspondence.
3. Subject for evening—"New Zealand for the Naturalists". J. H. Willis.
4. New Members (for July see p. 274)

August

(a) *Ordinary*:
Mr. D. J. Vance, 1 Hill Road, North Balwyn, 3104.
Mr. T. Brown, 46 York Street, Bonbeach, Vic., 3196.
Miss C. Williams, C/o 50 Greig St., Seddon, 3011.
(b) *Joint with Father*:
Mr. P. Spry, "Bundanoon", The Basin, Vic., 3154. (Interest—Botany.)
(c) *Country*:
Mr. R. Groux, 49 Park Boulevard, Ferntree Gully, Vic., 3156.

5. General Business.
6. Nature Notes and Exhibts.

Monday, 14 October—"Look into those Flowers". A. Swaby.

GROUP MEETINGS

(8 p.m. at National Herbarium, unless otherwise stated)

Thursday, 12 September—Botany Group. Mr. J. H. Willis will speak on "Historical facets of the Mallee Flora".

Wednesday, 18 September—Microscopical Group.

Friday, 27 September—Junior meeting at 8 p.m. at Hawthorn Town Hall.

Wednesday, 2 October—Geology Group.

Thursday, 3 October—Mammal Survey Group; meets in Fisheries and Wldlife Dept. Library, 2nd Floor, at 7.45 p.m.

Friday, 4 October—Junior meeting at Rechabite Hall, 251 High St., Preston, at 8 p.m.

Monday, 7 October—Entomology and Marine Biology Group meet at 8 p.m. in Mr. Strong's rooms in Parliament House. Enter through private entrance at south end of House.

Thursday, 10 October—Botany Group. Miss L. White wll speak, and her subject will be "Which Generation".

Native Plants Preservation Society

The N.P.P.S. is holding a field day on Saturday, 12 October, and will meet at Moats Corner, Dromana, at 10 a.m. Details may be obtained from Mrs. Faithful, 29-5108.

F.N.C.V. EXCURSIONS

Sunday, 15 September—Warrandyte district. The coach will leave Batman Avenue at 9.30 a.m. Fare $1.20, bring one meal and a snack.

Saturday-Sunday, 19-20 October—Weekend excursion to Charlton and Wychitella Forest. Leader Mr. I. O. Maroske. The coach will leave from Flinders Street, outside the Gas and Fuel Corporation at 8.30 a.m. Bring a picnic lunch for Saturday and two meals for Sunday. Cost for bus and dinner, Bed and Breakfast at the Charlton Motel is $12.00 per person, and the full amount should be paid when booking. Cheques to be made out to "Excursion Trust".

Preliminary Notice

26 December to 1 January—Traralgon. Accommodation has been booked at a Traralgon Motel and the party will may day trips to places of interest, such as Mt. Erica, Walhalla, Tarra Valley, etc., in conjunction with the Latrobe Valley F.N.C. The coach fare will be $16.00 and should be paid by the end of November, cheques being made out to Excursion Trust. Price quoted by the motel is $5.00 for Bed and Breakfast and the evening meal is available *à la carte* in the dining room. Motel charges to be paid individually, but bookings made through the Excursion Secretary.

Field Naturalists Club of Victoria

Established 1880

OBJECTS: To stimulate interest in natural history and to preserve and protect Australian fauna and flora.

Patron: His Excellency Major-General Sir Rohan Delacombe, K.B.E., C.B., D.S.O.

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Hon. Treasurer: Mr. D. E. McInnes, 129 Waverley Road, East Malvern, 3145 (211 2427)

Hon. Editor: Mr. G. M. Ward, 54 St. James Road, Heidelberg, 3084.

Hon. Librarian: Mr. P. Kelly, c/o National Herbarium, The Domain, South Yarra, 3141.

Hon. Excursion Secretary: Miss M. Allender, 19 Hawthorn Avenue, Caulfield 3161.

Subscription Secretary: Mrs. N. E. Lewis, 1 Billing Street, Springvale 3171. (546 4649).)

Group Secretaries:

Botany: Mr. K. Kleinecke, 8 Oliver Street, Ashburton 3147 (25 2415).

Geology: Mr. T. Sault, 9 The Avenue, West Rosebud.

Microscopical: Mr. M. H. Meyer, 36 Milroy Street, East Brighton (96 3268).

Mammal Survey: Mr. P. Homan, 40 Howard Street, Reservoir 3073

Entomology and Marine Biology: Mr. J. W. H. Strong, Legislative Council, Parliament House. Melbourne, 3002.

MEMBERSHIP

Membership of the F.N.C.V. is open to any person interested in natural history. The *Victorian Naturalist* is distributed free to all members, the club's reference and lending library is available, and other activities are indicated in reports set out in the several preceding pages of this magazine.

New Rates of Subscriptions for 1968

Ordinary Members	$7.00
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The cost of individual copies of the **Vict. Nat.** will be 45 cents.

All subscriptions should be made payable to the Field Naturalists Club of Victoria, and posted to the Subscription Secretary.

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The Victorian Naturalist

Editor: G. M. Ward
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The fine head study of the Lesser Long-Eared Bat was taken by Trevor Pescott; and further details on the species may be found on p. 291.

Wyperfeld Revisited (September 1967)

By V. Jacobs

Friday September 1st, 1967

It was four years to the day since I first visited Wyperfeld National Park, and we had arrived again within the gate of this, our largest Victorian national park. (*Vict. Nat.* **80**(8) 1963). Instead of my son, I had my daughter Simone for company, and expected to rendezvous with other keen "nats" later. A howling westerly had hampered progress with the caravan for most of the day, but near Dimboola a complete change in the wind direction made going easier. An arrival time of 7.30 made observation difficult, so we parked, fed, and tucked in for an early night.

On Saturday September 2nd, the sky was almost clear, and a light S.E. breeze was blowing. The carolling of some magpies, and the trill of a Fan-tailed Cuckoo were our alarm clocks, and from the window we could see Red-backed Parrots feeding in a wheatfield that was more weed than wheat, and was already showing the effect of the drought.

With vivid memories of my previous visit, and wondering what this occasion would bring, we moved into the park. We approached the Bullock's Head to find the tracks as dry as a bone. A flock of White-winged Choughs called plaintively and five kangaroos ceased feeding to retreat. On the slightly undulating ground beside the track, we renewed acquaintance with the gold and brown of Twiggy Hibbertia. It was more abundant than it had been four years before, and seemed to have regenerated almost regimentally, on a grid with ten feet intervals. Amidst the gold were many white stars of the Sand Cress.

We reached Wonga Hut camping area to find about two dozen campers there already, but owing to the large area, there was no overcrowding. Some campers were taking advantage of the spacious new rest and recreation hut. Behind the shower block, a shallow concrete pool is no doubt appreciated by the animals when the visitors are less dense. These are but two of the improvements undertaken by the Committee of Management and its efficient Ranger to improve the the park for visitors and all species of animals and birds within it. In 1963 this area had been covered with lush, long grass that made early morning movement in the dew-sodden herbage a gum boot affair. Now, from a distance there was a tinge of green, but close up it was the rare tuft of grass on a dusty background broken by the occasional Mediterranean Turnip.

After lunch we took the road towards Wonga Lake. Not far from camp we came to an area of a few hundred square yards with rabbit proof fencing. Within, *Callitris preissii* seeds had been sown, and many young plants were growing. This regeneration area, one of twenty, was a project carried out by staff and boys of Ararat High School. This fine contribution to the replacement of Slender Cypress Pines burned in the 1959 bush fire, is true conservation. The narrow winding track through the Moonah and Black Box was negotiated, and Maiden

Swamp reached. No water was here; just a brown, dry, dusty flat with a little vegetation. Our first pair of Ringneck Parrots was sighted here. Black Flat, which we came to next, was also without sign of water. In 1963 this area was clothed with grass that played a merry tune on the hub caps of the wheels as we drove carefully along, wondering every moment if we might strike a "submerged" log. Now the whole drab plain was in sight. Three ground feeding birds defied identification until they resumed their normal habits—they were Brown Tree Creepers.

Leaving the car we headed southwest into dune country, and soon became aware of the aggravating fruits of the Yellow Burr-daisy. No flowers were present, but many insects were feeding on Variable Groundsel plants. The "dry" was apparently retarding the flowering season, for only an occasional Tea-tree was in bloom. Small Clematis was frequent and in fruit, and one specimen was half in flower and half dead. A Willy Wagtail and a flock of White-browed Babblers moved across a clearing.

On looking down I saw a dainty white plant which I felt that I should have known. It looked like a Thryptomene, but that species is not recorded for the park. I should have recognized it at once as it is one of the features of the park—Fringed Heath-myrtle (*Micromyrtus ciliatus*).

(However, in my first choice of Thryptomene I was only wrong as regards the anthers, and in quite select company, for this species had also been put in that genus by Baron Ferdinand Von Mueller. He once had it as a Baeckea too).

Having circled back to the car we had lunch and moved north along the Wonga Lake track. Within half a mile Willy Wagtails, Grey Thrushes and Grey Silver-eyes were seen. The latter had vivid salmon colouring on their flanks and sides. More Wallowa was seen in flower and here and there an Early Nancy. While examining the latter we were approached by some Bull-ants, the first to be seen this visit. Four years ago there were many spaces along this track containing blackened and collapsed Desert Banksia ringed with cones. Now, in this formerly gaunt area, the spaces are being filled by three feet seedlings of the originals, together with large masses of Fringed Heath-myrtle.

We passed the little clearing from where the track to Lake Brambrook begins, and admired the colour on the hillside caused by the Mallee Bitterbush (*Adriana hookeri*). Three Pink Cockatoos flew past, and to see them on our first day was indeed a good sign, because they had been very rare in 1963.

As we climbed the next dune we noticed some Oondooroo in flower but as yet, fruitless. On the top of this dune, Slender Hop-bush formed a thicket intermingled with Grey Mulga in heavy bud. Wattle-birds called from the cypresses, and the thickets were alive with the cheerful twitter of wrens. Some canine tracks, probably fox, cut across our path. The cypresses in this area were regenerating well and seedlings were even appearing on the tracks.

We were on the lookout for a specimen of Erect Rice-flower (*Pimelea stricta*) (which is shown in *Vict. Nat.* **80**, 8: p. 253), and found it quite easily. The Porcupine Grass clumps had grown much larger now, and although the Rice-flower was straggling along the top of the grass, it was in good condition. It too was late with its flowering this year. The Mallee in the background were really trees now. In the distance a Horsfield Bronze Cuckoo called from a tall cypress.

Porcupine Grass with a background of Green Tea-tree.

Photo: Author

In the next Black Box area we glimpsed a Rufous Whistler and some Yellow-tailed Thornbills. We ought to have been within sight of Wonga Lake by now, but as happened last time, we were unable to find it. Just before turning back we saw ten kangaroos and a pair of Pardalotes in a patch of Flexile Hakea which was almost in bloom. Two tiny brown birds were making a nest in a hole at the end of a broken, horizontal branch, and were examined closely, but we could not identify them. However the Red-capped Robin which landed a few yards in front of us on the track was easily identified, and nearby were a couple of plants of Holly Grevillea, one of which was very yellowed indeed. Halfway back to Black Flat we found the origin of the sweet scent we had noticed on the way out—a Golden Wattle in full flower.

At Black Flat signpost we saw Fairy Martins, and listened to a Rufous Whistler's evening song. As we drove off, kangaroos which had commenced to browse raised their heads to watch our departure.

On the next day which was bright and sunny, we relaxed until midday in camp, re-examining specimens collected in 1963. By midday the sky was still clear and a strong N.W. wind was blowing. We set off along the Lake Brambrook track, and found a flock of Yellow-tailed Thornbills active in a dead cypress, while a flock of Regent Parrots swooped past. If I had seen no other but those birds at Wyperfeld, I would still have counted my journey worth while. Either sitting or flying they pleased the eye. A Brown Hawk flew lazily overhead as we passed through a belt of flowerless Green Tea Tree and some Slender Hop-bush. On the ridge south of Devil's Pools, the Slender Cypress Pines were quite dead, but the Scrub Pines in their midst were healthy. Around the pools, the flats were brown and dry. A pair of Australian Pipits were seen. One was much plumper than the other, and they were busy feeding, only moving off as we came near, but even then they did not fly. Simone, curious to know if they would fly, followed them for a chain or so and seeing that they were determined not to take to the air, joined me at the pools. *Pools*? One shallow splash covered approximately 35 square yards and the other 55! Many bees gathered on the margins of both, to collect water, while many soggy bodies indicated that some had not survived their attempts. A flock of Fairy Martins came to dive and drink, but in

only one attempt out of every three were they successful in gaining a beakfull of water. On the edge of the track were the only plants of any size; *Micromyrtus ciliatus, Senecio lautus,* and *Hibbertia virgata.* A plant of *Acacia spinescens* seen in 1963, was not located. A few Thornbills fled to the scrub and a number of White Cockatoos flew overhead.

Soon we came to the area of River Red Gum that borders Lake Brambrook. There seemed to be many more broken branches littering the ground than previously. Quite a few Weeping Pittosporums of juvenile age were growing close to aged Red Gums and Galahs and Magpies were frequent there. A large flock of Smokers flew swiftly to the south, cutting accurately in yellow and black against the blue sky. A trio of apparently crazed Galahs zig zagged low through the trees while a hawk, the cause of their panic, soared overhead. Brown Tree Creepers were busy, and a Ringneck with a pale blue tail perched in a dead tree. Another Pink Cockatoo was seen here.

The track was taking us to the west, and away from Lake Brambrook, so we climbed a high dune and sighted the lake to the north. In those dunes, *Acacia ligulata* was flowering, but not so the Yellow Burr-daisy. Two plants of Tree Tobacco (*Nicotiana glauca*) were flowering and on the margin of the lake were some specimens of three-nerved Acacia (*Acacia trineura*), small trees with dense rounded crowns and black trunks. Ant Lions' pits were numerous in this area, and most were occupied.

The lake itself was a dry brown bed; a phrase with which the reader is becoming very familiar. Only occasionally could there be seen a sprinkling of green clover mixed with kochia or a species of echylaena. The surface of the ground showed no cracks and was quite powdery. No rain had fallen here for a long time.

At 4 p.m. the sky was still clear, and a bright sun lit up some bleached kangaroo and emu bones. Since 1963 a concrete dam had been built to catch run-off water at Lake Brambrook and there were many tracks around the edges of it, together with a number of bees.

The sun shone over our shoulders as we returned, lighting vividly the white trunks of the gums. We sighted three Pink Cockatoos, some Smokers, and a Grey Thrush. High in a dead tree two Nankeen Kestrels sat, showing their chestnut backs before taking off to circle the area. A Willy Wagtail scolded, a Kookaburra laughed, and a Fantailed Cuckoo trilled. Above Devil's Pools, a Wedge-tailed Eagle

Hibbertia virdata (R.Br.) Ex.D.C. Twiggy Guinea Flower.

Photo: Author

was soaring, and in the scrub a pair of White-eared Honeyeaters drew our attention, but they sat tight in a bush even when we poked our heads in to look; perhaps because it was their roosting place. Near Mt. Mattingley, Simone heard a sound that she likened to peas rattling in a box. The cause of this was a pair of Crested Pigeons in a tall cypress.

Reaching camp, we drove the car to Eastern Lookout (to help recharge the battery), and in doing so saw ten kangaroos and another Pink Cockatoo.

Before breakfast on the next day I took a walk over Lake Brimin. It was neither direct nor comfortable, as the prickly bushes which almost cover its surface offer much in the way of obstacles. There is a little grass and clover, but brown was the predominant colour. Magpies, Mudlarks, Welcome Swallows, Ringneck and Red-backed Parrots were in evidence. In about one hour, thirty kangaroos and one emu were seen.

During breakfast we watched many Red-backed Parrots feeding near a decayed gum stump, but could not decide what they were eating. After our meal I drove Simone to the far side of Lake Brimin to show her the kangaroos, but they had disappeared. However, we did see a flock of White-rumped Miners and two Pink Cockatoos. Each sighting of the latter was exciting, as they indicate one of the more important uses of the park, namely to allow rare species to breed, and to ensure the safety of their offspring.

At this point we set off for Yaapeet to get petrol, and in the township, some fine examples of Gold-dust Wattle (*Acacia acinacea*) were a blaze of colour.

On the way back to the park we stopped beside a couple of Tree Tobacco plants, and our attention was drawn to the antics of a pair of birds which perched and fed alternately on the margin of a wheatfield. They were Singing Honeyeaters. In the scrubby roadside mallee, Yellow-tailed Thornbills called, while on a sandy bank opposite, six White-faced Chats were occupied feeding a rather plump cuckoo.

Back at camp we found Alan Thomson and his party, but the total number of camps at Wonga Hut had decreased, and Wyperfeld began to return to normal. Eleven emus came from the Mt. Mattingley direction and sauntered casually across the clearing, pecking as they went, until prompted into a trot by my movements with the camera.

After lunch the Jacobs and Thomsons headed for Black Flat. The extra three pairs of eyes and one pair of binoculars soon resulted in a call for a halt. There we saw Brown Treecreepers, Regent Parrots, a Ringneck at its nesting site, Willy Wagtails, Black-faced Cuckoo Shrikes, and some Yellow-tailed Pardalotes arguing with some Tree Martins for possession of a hole at the end of a branch.

At Black Flat we left the vehicle and followed the Nature Trail that leads to Round Lake. The Committee of Management took eighteen months to agree to this venture, and the value of such a trail lies in the aid it gives to newcomers to the area. They may quickly familiarise themselves with many floristic and topographical features. The second Nature Trail is towards Eastern Lookout, is six and a half miles in length, and needs to be taken by car. It too is a valuable route. However I would suggest a limit be made to the number of these trails, or the primitive aspect of the park may be lost. Rudd Campbell, the Ranger, carries a supply of guide books for both trails, and he also has stocks of "The Vegetation of

Wyperfeld National Park" by Ros Garnet.

While on the Round Lake trail I had my first view of the Black-backed Wren. Spiny-cheeked Honeyeaters called and Brown Hawks could be seen in the distance. Yellow-faced and White-eared Honeyeaters were also recorded. A "Cooee" from the girls caused us to hasten to the scrub, where we missed seeing a scuttling "mouse-like" bird with a flash of red near its tail. It hay have been a Mallee Heath Wren.

Though Round Lake was dry and brown on the surface, some spots were damp a few inches below the surface. We started our return journey and soon found ourselves amidst a large patch of Muntries (*Kunzea pomifera*); and this low growing shrub was so extensive that we could not determine its area or origin. Golden Pennants (*Loudonia behrii*) which had been in full flower four years before, were now only in bud.

That evening we drove along the Car Trail, seeing scores of kangaroos. Near the Lignum Swamp two families of White-winged Choughs were seen. Near Eastern Lookout a Mulga Parrot refused to fly as we drove within inches of it, being busy with its evening meal. We stopped and were able to approach close enough to recognize the Wild Mustard which it was eating. Later, the sweet singing of a Brown Flycatcher led us to a pair of them, and nearby a second pair. The second pair was so unafraid that I was able to walk to within eight feet of them while one still sang. Between Eastern Lookout and Wonga Hut there is a distinctive stand of ten feet high Weeping Pittosporums beside the mature adult. The young ones are suffering heavily from a black scale, but the adult seems to be immune from the attack.

In the early morning of the next day, small mobs of between five and nine kangaroos moved away from our side of Lake Brimin, while equally small mobs fed over on the far side. In the stand of Black Box just east of Wonga Hut clearing, a flock of Orange-winged Sitellas and a pair of Red-tipped Pardalotes searched for food. Brown Flycatchers were there also, and a pair of Crested Pigeons were feeding on the ground. Five emus stood and watched cautiously.

After a lazy breakfast we drove to Eastern Lookout passing a dozen late-browsing kangaroos. We walked up the Fire Break track where birds were plentiful and we saw black-backed Wrens and Yellow-tailed Thornbills. We also saw White-plumed Honeyeaters, a Whistling Eagle in the distance and Buff-tailed Thornbills calling as they flew past. A little farther on a "Wedgie" was being chased off by two Magpies. Near an open Lowan mound Nealie was in flower. A Grey Thrush fluted as two Nankeen Kestrels glided over.

Pardalotes could be heard and we saw a Yellow-faced Honeyeater. This bird does not appear in the Bird-List for the Park, but having been seen fleetingly earlier, and very clearly four times later, I think that it could be added. White-naped Honeyeaters and Red Wattle-birds were also seen.

At the margin of the park, where the mallee gave way to a paddock of weedy, stunty wheat, a movement attracted our attention. A half grown joey was attempting to move itself along the ground, but with both its femurs broken, its pathetic scrabbling was not very effective. The parents lay dead close by; the large buck enlarged in a bloated turgidity, and the doe, its throat torn out by shotgun blast a few yards off. A cartridge glinted in the sun showing how this little massacre had been perpetrated. It is a great pity that the protector of

Decaying River Red Gum forest, south of Lake Brambrook.

Photo: Author.

the wheat (which I believe did not mature) had not returned to investigate the results of his shots. His neglect caused unnecessary suffering to the joey, and to us was left the only course of action possible.

It seems inevitable that where National Parks and farming areas adjoin, this sort of event may go on occurring and even more so in drought conditions. Perhaps a buffer area between park and farmland would solve the problem.

Mr. and Mrs. Thomson returned to the car, while the girls and I continued up the track, noting more Yellow-tailed Pardalotes. Soon, another dead Kangaroo was noticed. Narrow-leaf Red Mallee was in flower along the track, and in the open spaces Twiggy Hibbertia was plentiful. Two Brown Flycatchers were approached closely until an argument between a Grey Butcherbird and some Honeyeaters disturbed them.

We turned due north into the scrub, and sat down to lunch beside some Scrub Pines. Some White-browed Babblers bounced off into the scrub. After eating we moved off, generally guided by the compass, but often finding it easier to follow the emu tracks that led in the desired general direction. The sky was overcast but no rain fell. Wonga Hut, we heard later, did have a shower. It is interesting undulating dune country here, with everchanging stands of shrubs. Dense patches of Pink Velvet-bush alternated with slender Daisy Bush. We saw what appeared to be little piles of humus, but they were ant turrets, made of, and camouflaged at the same time with the small leaves of local plants. *Calytrix tetragona* was abundant here but without flower. The flower heads of Grey Mulga were in tight bud—yellow green in colour. On the next rise *Acacia calamifolia* had tight buds and pods also. A little Spiny Acacia was seen and a splash of delightful purple revealed a rounded shrub of *Baeckea crassifolia* whose flowers are usually pink.

A bird, shuffling along the ground at first looked rather unusual, but it was a White-eared Honeyeater—a strange behaviour for that bird. Perhaps it was one of those which had been following us for quite a distance. A few vivid green, sticky bushes eluded identification, and back at camp Fred Rogers was of no help either. We should both have listened to his "better half"; for some days later when we met at Wail, the first comment he made was, "That plant of yours is Turpentine Bush". We rea-

lized then that Mrs. Rogers had been saying just that.

A few large stands of Hakea Acacia were seen in flower, and in a small clearing, a pair of Mulga Parrots were intently busy beside a tussock of Porcupine Grass. When they flew off we examined the tussock, which had a small depression about three inches in diameter and four inches deep horizontally. Were the parrots making a nest?

All through the area there was the evidence of ant activity in the numerous turrets, but only a few ants were working. Where they were active their labours produced a rich red damp sand, quite a different shade to the yellowish sand of the surface.

We came to a faintly marked track that was probably the old one, and a few yards farther on the well-defined one, which led to Eastern Lookout.

We headed west on the last leg of our circuit, and immediately saw a couple of female or immature Black-backed Wrens. In a clearing which was flanked by a line of Weeping Pittosporums, we noticed the rounded shapes of two young cuckoos crouching in the shade of some Porcupine Grass. They were being fed by some honeyeaters. Were they of one or two family groups? We sat to await the solution, but a couple of Willy Wagtails shouted an alarm and they dispersed.

At 3 a.m. on the succeeding morning, the stars were exceptionally bright; and at 7 a.m., Alan and I took a short walk north of the camp. Yellow-throated Miners were vociferous, seemingly trying to out-do the carolling of a pair of Grey Butcherbirds. Two Ravens flew off. Ringnecks were feeding on the ground. Here as elsewhere in open areas, the Hibbertia made a fine show. This morning Simone saw a Striated Pardalote popping in and out of a nesting hole.

During the morning we happened to meet the Ranger, and boarded his vehicle for a rapid circuit of some places which our car or feet could not reach. Some of the tracks we negotiated were barely wide enough for the Landrover, and occasionally at dead slow pace we made an intricate pattern of tyre tracks through close growing mallee trunks. A Common Bronzewing whirred, and winged away ahead, while a flock of White-fronted Chats crossed our path. We crossed Lake Jerriwirrup (as dry as the others), and leaving the vehicle, walked over a dune to be amazed at the size of the "Big Tree" or Old Be-Al as it also is called. According to J. Willis its age is believed to be between 700 and 900 years. Its massive trunk bears a

A natural graft on River Red Gum at Black Flat.

Photo: Author

shapely crown that dwarfs any other River Red Gum that I have seen, and its spreading roots appear to have restricted other growth to the extent that, for an area of acres around the Big Tree, there is only a low amount of vegetation with no sizeable shrubs or trees: an ideal natural firebreak. In this area Australian Bugle was seen in flower. A male Golden Whistler sighted, and Grey Fantails fluttered around the big tree—what a massive roosting place for birds! I would like to spend a dusk and a dawn at this very spot to see how well it served its avifauna.

On we went to a spot near Shepherd's Huts where Pink Cockatoos were nesting in high holes in dead trees. A head with its raised red and white crest was seen peeking out of one of these holes. A slap against the Landrover door, and the cockatoo sailed, underparts showing red, to a nearby tree to be joined by its mate. The birds in this area have a good record of rearing their young.

I had lost my bearings by this time, and was intrigued when the Landrover dived over the rim of the deep Wonga Lake, and crossed the dry bed. We had never managed to find this lake on foot. Just beyond the lake we overtook a male emu with five fifteen-inch high chicks. We had a good view as they ran parallel for a moment before following their parent into the bush.

This exciting diversion over, we lunched and headed for Black Flat. We paused to photograph a Shingle-black Lizard, which posed with its blue triangular tongue spread aggressively from a wide-open mouth. Here too we noted Black-winged Currawongs, Dusky Wood-swallows, an Elegant Parrot, a Golden Bronze-cuckoo, Pardalotes, a Pallid Cuckoo, Tree Martins, Black-faced Cuckoo-shrikes, and White Cockatoos. Here, too, after identifying its call, I tracked a Restless Flycatcher. Not having seen one for years, I wanted to see its white throat (and did), but only after a walk of five minutes. Even then I could not lessen the final thirty yard gap. This bird is certainly much shyer than its relatives the Grey Fantail and the Willy Wagtail.

Reaching Black Flat we turned sharply to the right and drove around half of its perimeter. Right in the centre stood a male Chestnut-breasted Shelduck. We looked around in case he had a family, but none could be seen.

It was now 2.15 p.m., and taking our compass we left the car, heading West past the Weeping Pittosporums. A flock of Galahs warned of our movements. Ant Lions were again evident in this region. Kangaroo tracks were measured and made ten feet between footprints. White Cockatoos, Pink Cockatoos and a male Rufous Whistler were seen. Bird activity was everywhere—two pairs of binoculars were not enough for four watchers. A lovely songster was stalked, and found feeding on banksia seeds below the black skeletal remains of the tree. It was the Gilbert Whistler, which has been commonly seen in this area of the park since the big fires killed the banksias and freed the seeds. In the dense zone in the next dune valley Yellow-tailed Pardalotes and White-eared Honeyeaters were seen. There was a density of tea-tree and two feet high banksias in this area. Up the next steep dune we went, our nostrils enjoying the heady perfume, while our eyes enjoyed the sight of Wallowa scattered here and there. From the top of this high sand hill, Lookout Dune can be seen, and the view that had been a distressing burned area four years ago, was now a glorious Mallee-garden. It was an ideal bird-watchers situation, with the living plants chest high, and above them the black outstretched

trunks of the Mallee acting as perches for the many birds. Here Alan and I saw the first of frequent appearances of the White-fronted Honeyeater. Another species of honeyeater seen more often than the White-fronted, was busy with its mate, feeding a young, calling cuckoo who hardly ceased to complain that it was hungry. This insistent demand on the foster parents kept them very busy catching insects in flight by hawking and hovering, time after time. "And that's a different one," said Alan, stubbornly settling his beret and calling out details of its description.

"Black around eye, white eyebrow and ear patch, dark brown scalloped back, olive on wings seen in flight, light grey below with a darker patch down the breast bone".

So it was written, and used in our search in all the books we carried, but to no avail. Has any reader an idea which bird it was we saw? This was not a casual glimpse, for the birds and their foster child were separated by us, and each time in order to join them, the adults had to closely circle us. At that time we didn't think it possible that identification could be so difficult.

We pressed on to the next shallow valley where a Red-capped Robin could be clearly seen until a Spiny-cheeked Honeyeater chased it away. Yellow-winged and Yellow-faced Honeyeaters were also seen there. On the way back over the dunes we saw some Flame Heath (*Astroloma conostephioides*) in flower. We were reading the compass on our return journey but even so we missed the car and in the dusk it took a half hour to find it.

Alas, this, the next day was the one of departure, and as we drove out, we saw eleven species of birds which included the White-throated Tree Creeper—a "first" for this visit.

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Birds Nesting on Sheeps' Backs

by A. H. CHISHOLM

Many instances have been recorded, in Australia and elsewhere, of certain birds "house-keeping" in odd situations, but surely the strangest of all are those concerning nests built on the backs of living sheep.

I discussed this matter in the *Emu* for June, 1967 (p. 376), mentioning four reports of the kind. Two of these were based on Western Victoria in 1910, a third came from a property in South Australia in 1960, and the fourth was the subject of a reminiscent paragraph sent from Mittagong, N.S.W., to a Sydney newspaper in 1967. In two of the cases the birds concerned were said to be English Starlings; in the others the species was not indentified.

The most assured report was the one from South Australia. As related in my *Bird Wonders of Australia* (6th edn., 1965, p. 194), Mr. E. L. Foord, of Robe, noticed thin twigs and grass in the centre of thick wool on the back of a sheep about to be sheared, and on looking closer he was astonished at finding three newly-hatched starlings in the cluster.

The parent birds had chosen that "moving" site, and kept in touch with it, although the sheep so favoured was merely one individual of a considerable flock in a 50-acre paddock.

Now, as a further remarkable fact, another case of the kind has come to notice. Having been given recently a large collection of letters and cuttings on natural history subjects left by a former sub-editor of the *Sydney Mail* (closed down 30 years ago), I was interested to find a letter dated April, 1938, from a landowner at Wallendbeen (N.S.W.), reporting that a Starling's egg had been discovered on the back of a Corriedale sheep brought in for shearing. The egg, it was said, appeared quite sound, but on being opened was found to be addled.

"Evidently", the writer added, "the parent birds did not realise that their nest-site was a wandering one".

Here it may be said that other "wandering" sites, such as boats and motor-cars, have been used by nesting birds, but, unlike the sheep, none was mobile when selected. However, it seems likely that three reasons caused the Starlings to adopt the sheep—first, shortage of other nest-accommodation, secondly the attraction of thick wool, and thirdly the fact that a sheep's back remains fairly level even when the animal is resting.

Perhaps the most remarkable aspect of the matter, however, is that each of the birds was able to find its particular sheep, among a large flock.

Yet this might not have been so difficult as would seem. By flying above a flock the bird would probably be able to spot its nest-material; and, further, it may have developed an element of the skill of some shepherds in recognizing particular sheep. Whether any Australian sheepmen possess this ability I don't know, but some in Britain do so. Thus, a few years ago, a shepherd of 19 years who gave evidence in a sheep-stealing case in Wales testified that he was able to identify each of his father's sheep, numbering in all about 1200. And that claim was endorsed by a detective, who declared that he knew a number of farmers each owning several hundred sheep who were able to identify each one by it face and the way it grazed. So, then, it would appear that the birds which nested on the backs of sheep learned their business in much the same fashion as the farmers!

Lesser Long-Eared Bat

Some Geelong Notes

by TREVOR PESCOTT

The Lesser Long-eared Bat (*Nyctophilus geoffroyi*) is undoubtedly the most common species of bat in the Geelong district, although the status of the various other species in the Order Chiroptera is unknown accurately.

The district lacks extensive caves of either basalt or limestone, and apart from isolated coastal caves and mine shafts at Steiglitz, we have few places where there can be any large concentration of bats.

The Steiglitz shafts are potentially valuable, but are not easily accessible, so that investigation of these may produce unexpected results.

Over some 20 years, I have handled dozens of specimens of *Nyctophilus geoffroyi,* these being obtained from some rather interesting sources; it appears they readily adopt temporary quarters, and it is quite impossible to predict where they will occur.

The first observation of note refers to two specimens recovered in the nest of Fairy Martins (*Hylochelidon ariel*), built under an overhanging creek-bank at the You Yangs. In April 1957, I opened several of the mud nests to investigate the contents of the disused nests. Two bats were found in one of the nests. One was killed amongst the falling clay, the other, being unharmed, was released after examination and photography.

In October 1959, a colony of about 30 bats of this species was found in a hollow stump about four feet high. This is the only colony I have found (although I have been told of others in adjacent areas), and it was in a patch of blue gum and snowy mint-bush at the You Yangs.

A coat hanging in a shed at Steiglitz produced another two *N. geoffroyi,* and with them were two other bats tentatively identified as *Chalinolobus gouldii.* This is a typical camping place apparently, for I have heard of several similar occurrences. This was in August 1964.

When a wooden rotunda was being demolished at East Geelong, in May 1967, several bats were found to be in residence among the rafters and battens of the roof. One was caught and identified as this species.

By far the most unusual, however, was a Lesser Long-ear which a few years ago (May 1964) gained entry to my brother's home in Highton, a Geelong suburb. The animal was noticed flying around the lounge and entrance hall. It eluded capture and disappeared.

The next evening it reappeared, and just as suddenly disappeared; just by chance we noticed the pendulum chain of a cuckoo clock moving.

The animal had been using the clock as a refuge, and as soon as its freedom of flight was challenged, it flew immediately to the clock and squeezed into the clock interior through a small hole from which hung the winding chain.

It surprised us how readily it adopted the clock and how well it knew exactly where to retreat when chased.

Readers' Nature Notes and Queries

These columns are available for all members, young and old, to bring before others their own observations in nature. Correspondence may be sent to the Editor, 54 St. James Road, Heidelberg.

Platypus in Caves

This most interesting and enlightening note comes from E. Hamilton-Smith of 17 Helwig Ave., Montmorency, Victoria 3094.

The use of burrows by the platypus is, of course, well-known, so its occurrence in caves is not surprising. However, to my knowledge, this has not previously been reported in the zoological literature.

Part of the cave known as Dalley's Sinkhole (M35), Murrindal, Victoria, is apparently regularly used by the platypus. This cave carries part, at least of the underground section of the Murrindal River. One room of the cave has extensive sandbanks along the edges of the stream and tracks or burrowing are often seen on these. A living specimen of the Platypus tick, *Ixodes ornithorhynchi*, was collected from the sandbanks on 12th April, 1963; a dead platypus was seen in a small pool on 27th March, 1964 (its removal as a specimen was impracticable at the time and it had been washed away by flooding on a succeeding visit); and a live animal was seen by John Driscoll of the Victorian Speleological Association during March, 1968.

The underground stream is not accessible throughout its length, so the actual distance from this cavern to the free river surface is unknown. However, on the minimum possible distances, the room concerned is some 1,700 ft. from the cave swallet and some 700 ft. from the resurgence.

Other similar reports include the following: In Junction Cave, Wombeyan, N.S.W., on 5th August, 1962, reported by J. Cherry of the Sydney Speleological Society; in Moon Cave (B2), Buchan, Victoria, reported by G. Rebecchi of the Victorian Speleological Association; in Croesus Cave, Mole Creek, Tasmania, on 4th September, 1966, reported by P. Richards of the Tasmanian Caverneering Club (Northern Branch). All of these reports are of the sighting of a live animal and all are from caves through which a stream is flowing.

Note on Blind Snake

While staying at Whorouly in the North-east of Victoria at Christmas 1967, I picked up a freshly killed specimen of the Blind Snake, *Typhlops nigrescens*. It was slightly over a foot in length and looked something like a giant earth-worm at its plump blunt rear end, except for its beautifully scaled skin pattern. Then I discovered there was a tiny head at the other end with minute eyes and a very undershot bottom jaw. There was some damage to the middle of the reptile where it had been attacked, possibly by a bird. I found it in the bottom of one of the deeply eroded dry water courses running from the higher land to the Ovens River. A little further on there was the fresh carcase of an Owlet Nightjar, being rapidly cleaned by swarms of large ants. One of these birds had been flushed from the hollow of a dry tree earlier in the week.

These following observations are from Mrs. E. Lyndon of Leongatha, Victoria.

Dollar Bird at Dusk

On a very hot evening in early January this year, we pulled in for the night at the camping park at Yea. It is a pleasant spot, in a bend of the river, and there are always birds to be seen and heard along the watercourses.

At dusk, there was a disturbance in the bird world with strange and alien sounds among familiar voices. I hurried down to the creek along a little cattle track (with one eye on the ground in case of night wandering snakes), and just above the tops of the tall red gums on the flat, a big black bird outlined against the sky, was flying in a roughly circular course returning always to one point. Darkness was falling rapidly, but as I came directly underneath I saw the large white coin spots of the Dollar Bird. High up the trunk of the tree was one of those huge curls that sometimes occur on certain gums. From the centre of it a limb had rotted out, leaving a dark hole. Regularly, on every circuit, the Dollar Bird paused at this hole and

leaned in so that its head was hidden for perhaps six seconds before launching itself on another flight. Once in a while it alighted on a favourite perch on an outer limb, six feet above the level of the apparent nest. When I could no longer distinguish the bird in flight, the binoculars showed it landing at the hole. It made no sound during this time. In the morning there was neither sight nor sound of Dollar Birds, and the hole in the tree seemed quite deserted.

Wattle-birds Feeding Time

I was most interested to read, in the *Naturalist* (85 (5) p. 130), the note from Mr Jones about Wattle-birds feeding on dusk flying insects. Years ago, in 1950, I witnessed a similar incident, but had never before seen or heard of such a habit in these birds until now.

We were living on a farm near Boolarra, and there were Lucerne trees (*Cytisus*), flowering luxuriantly in the garden. Besides the bees there were Red Wattle-birds squabbling noisily all day long among the blossoms. Coming up the hill one evening toward the house, I saw, just at dusk, but silhouetted against the evening sky, a party of large birds hawking like Swifts into a cloud of insects. They too were silent except for the snap of beaks and rustle of wings. They frequently alighted on the fence posts before launching themselves again to the attack. It took me some time to decide the birds' identity, and even then it was almost unbelievable. There were less than a dozen birds, probably all those that came to the trees during the day. It would be interesting to have reports from other observers.

Bandicoot

We stopped the car recently to examine a bandicoot that had been killed when crossing the road near Berry's Creek. It was unmarked and a fine obese specimen of *Isoodon obesulus*. Some time in its career it had lost one front leg, probably in a rabbit trap. The scar, high under the shoulder, was long healed. Evidently these animals can forage a good living without scratching or digging, by nose power alone. This poor fellow was doubly unfortunate.

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The Insect Fauna of Mt. Widderin Cave, Skipton, Victoria

by E. Hamilton Smith*

A description and map of the Mt. Widderin Cave has been published by Ollier (1963). A second paper by Simpson & Smith (1964) discusses the former occurrence of bats in this cave. To briefly summarize the latter paper, large numbers of bats were reported in 1866 as living in the cave but bats were not known to inhabit the cave in 1895 (nor have they been reported since), and it is clear that the species concerned was the widespread *Miniopterus schreibersii*.

At the present time, the floor of the cave in those areas named by Ollier (op. cit.) as the Main Chamber and the Ballroom is covered with decomposed bat guano. In the Main Chamber this is granular and loosely packed, retaining some resemblance to its original appearance. That in the Ballroom is reduced to a fine soil which is tightly packed and has a relatively smooth surface. The amount of this material present is only explicable by comparison with known colonies of *Miniopterus schreibersii* if one assumes that Mt. Widderin Cave served at some time in the past as a nursery site for this bat. The structure of the cave is comparable with other caves currently being used by this bat in such a way, as described by Dwyer and Hamilton-Smith (1965).

The present author has taken a small and extremely interesting collection of fauna from the floors of this cave which is listed in Table 1.

In addition to these species, a number of *Nothotrichocera* sp. (Diptera: Trichoceridae) were collected from the walls of the Main Chamber within

* 17 Helwig Ave., Montmorency, Victoria 3094.

Table 1
Species collected from Mt. Widderin Cave

Species	Notes
Order ARANEAE sp. indet.	Main Chamber
Order PSEUDOSCORPIONIDA *Pseudotyrannochthonius* sp.	Main Chamber/currently in press by Beier as a new species
Order COLLEMBOLA sp. indet.	Main Chamber and Ballroom
Order COLEOPTERA *Notospeophonus castaneus castaneus* Moore (Carabidae)	On clay floor in tunnel between Main Chamber and Lake
Pseudonemadus integer (Port.) (Catopidae)	Ballroom
Corticaria sp. (Lathridiidae)	Main Chamber and Ballroom

sight of daylight. It is not unusual to find species of this family in such a location. However, this species will not be further discussed as it is ecologically unrelated to the floor fauna.

It is now of considerable interest to compare this fauna with the species assemblage usually found on the floor of caves inhabited by nursery colonies of *M. schreibersii*. Such caves in Southern Australia, as described by Dwyer and Hamilton-Smith (op. cit.), have a characteristic guanophilic population and although some variations occur from cave to cave, the pattern of such populations is described in Table 2.

TABLE 2
Characteristic composition of guanophilic fauna in Southern Australian caves

Species-group	Notes
Order ISOPODA	At least one species
Order ARANEAE	Usually several species
Order PSEUDOSCORPIONIDA	Usually one species, often apparently endemic to a single cave
Order ACARINA *Cilliba coprophila* Womersley	Often with one or more other species
Order COLLEMBOLA	Usually one species
Order BLATTODEA *Gislenia australica* (Brunn.)	
Order PSOCOPTERA *Psyllipsocus ramburi* Selys-Longchamps	
Order DIPTERA	Often a number of species, including such families as Sciaridae, Sphaeroceridae, Phoridae, Anthomyidae and others
Order LEPIDOPTERA *Monopsis* sp. (Tineidae)	
Order HYMENOPTERA	One or more species of Ichneumonidae or Braconidae
Order COLEOPTERA	
Fam. Carabidae *Notospeophonus* sp. and/or *Speotarus* sp.	
Fam. Histeridae	One species
Fam. Staphylinidae *Quedius* sp.	*Myotyphlus jansoni* (Matth.) may also occur (see Hamilton-Smith & Adams (1966))
Fam. Catopidae *Pseudonemadus* sp.	
Fam. Ptinidae *Ptinus exulans* Erichson	
Fam. Lathridiidae *Corticaria* sp.	*Corticaria* sp. and *Atomaria* sp. do not appear to occur together in the same cave, but one of the two is always found. Some caves have another small beetle, currently undescribed, belonging to the Jacobsoniidae.
Fam. Cryptophagidae *Atomaria* sp.	

The spider and springtail from Mt. Widderin are not yet determined, but they are identical with or closely related to species from other guano caves. Thus, all of the Mt. Widderin species could clearly have been derived from the guanophilic population which inhabited the cave floor concurrently with the bats roosting in the cave. Many, at least, of the normal assemblage of species would have also been present at this time, but have become extinct with the vanishing of the bats.

A further point of interest is that the apparent distribution of *Notospeophonus* within the Mt. Widderin Cave, i.e., away from the guano-derived soils, is consistent with its distribution in "active" guano caves where it occurs near guano-covered areas but rarely upon them.

Guanophiles generally show no adaptation to cave life and are conspecific with epigean forms. Cave biologists generally accept that these species are unlikely to evolve in the direction of becoming specially adapted to a cavernicolous life. Such specially adapted forms are known as troglobites. One of their primary characteristics is a low metabolic rate, as they must survive in an environment where food is scarce. It is thus reasonable to suggest that troglobitism is unlikely to develop in species which live literally in the midst of abundant food. Vandel (1965) or Mohr & Poulson (1966) might be consulted for further discussion of this.

Herein lies the particular interest of the Mt. Widderin fauna. At least six species have survived the vanishing of the bats and consequent change in food supply. Five of these belong to taxa in which troglobites are not uncommon, the exception being *Corticaria* sp. To my knowledge this species, which is recorded only from a number of Australian caves, is the only Lathridiid known from caves. The other taxa listed in table 2 but not occurring in the Mt. Widderin fauna include few troglobites.

The species reported here have survived the transition from a guanophilic life to one of being cave-dwelling without dependence upon guano as a food source. Although showing no morphological adaptation, three species — *Corticaria* sp., *Pseudotyrannochthonius* sp. and *Notospeophonus castaneus* — are only recorded from caves. Obviously adaptation to a troglobitic form cannot occur in a brief time period and would not be expected in this fauna, but this population does demonstrate that evolution from a guanophilic form to troglobitism may not be precluded.

The specimens recorded in this paper are lodged in the Biospeleological Collection of the South Australian Museum. The author is particularly glad to acknowledge the help of Mr. C. Notman, owner of "Mt. Widderin", in allowing access to the cave and providing other hospitality. Tribute must be paid also to Mr. Notman's care to ensure the continued conservation of this important cave.

References

Dwyer, P. D., & Hamilton-Smith, E. (1965). Breeding caves and maternity colonies of the bent-winged bat in South-eastern Australia. *Helictite,* **4**: 3-21.

Hamilton-Smith, E., & Adams, D. J. H. (1966). The alleged obligate ectoparasitism of *Myotphylus jansoni* (Matth.) (Coleoptera: Staphylinidae). *J. Ent. Soc. Qld.,* **5**: 44-45.

Mohr., C. E., & Poulson, T. L. (1966). The Life of the Cave. McGraw-Hill, New York.

Ollier, C. D. (1963). The Skipton Lava Caves. *Vict. Nat.,* **80**: 181-183.

Simpson, K. G. & Smith, G. T. (1964). Bat mandible from Mt. Widderin Cave, Skipton, Victoria, *Vict. Nat.,* **81**: 78-79,

Vandel, A. (transl. Freeman) (1965). Biospeleology—the Biology of Cavernicolous Animals. Permagon Press, Oxford.

Mammal Survey Group

ANNUAL REPORT,
JANUARY 1967 TO JUNE 1968

The group ended this period with 24 members and held 17 meetings at which an average of 13 members and 4 visitors were present. Ten field survey camps were held during 1967 and three in 1968, each attended by about 12 people. A summary of the field survey activities is given in the accompanying table.

The group has gained considerable experience in trapping, spotlighting, recording and identifying the various species encountered, and has entered the next season with much greater confidence in its ability to carry out reasonably thorough sample surveys within the limits of the time and facilities available. In addition to organized field surveys, trapping equipment was used by members on 17 occasions, and spotlights on 15 other occasions.

Detailed results of the survey work are to be published in the *Victorian Naturalist*. A paper describing the results of the Darlimurla survey (which occupied much of 1966-7) has been published and a paper giving the results of the Mount Charlie survey is in preparation.

In addition to the field survey work, the group collected approximately 300 reports of random sightings of approximately a thousand specimens of thirty different species, throughout the State.

During 1967 the collection of data for plotting the incidence of native mammals within the metropolitan area of Melbourne was begun. A number of reports have been received and groups of members have carried out some spotlighting. It is estimated that sufficient material will be available for publication in about eighteen months time.

Unfortunately, the field survey work was seriously curtailed in the early part of 1968 by the hazards of the acute fire danger condition of the bush and only three surveys were carried out in the first six months.

The group wishes to acknowledge considerable financial assistance from the Ingram Trust for the purchase of trapping and spotlighting equipment and to express its thanks to the Director and Staff of the Department of Fisheries and Wildlife for considerable technical assistance and co-operation and for the use of their library for meetings.

SUMMARY OF FIELD SURVEY EFFORT AND RESULTS
January 1967 to June 1968

Date	Area	Persons present	Trap-nights	Specimens caught	Spotlight hours	Specimens seen	Species identified
Jan.	Lake Mountain	10	81	5	—	1	4
Feb.	Darlimurla	11	55	8	18	4	6
Mar.	Darlimurla	11	160	13	21	13	10
May	Lake Mountain	13	91	34	24	15	5
June	Darlimurla	15	140	18	36	10	8
July	Kinglake	10	70	2	12	8	6
Sept.	Riddle	16	81	4	17	49	10
Oct.	Mt. Charlie	18	81	25	16	43	5
Nov.	Mt. Charlie	11	62	6	15	28	7
Dec.	Thomson Riv.	14	58	10	33	52	10
Apr.	Aire Riv.	9	160	57	11	6	6
May	Lit. Sugarloaf	11	78	27	12	33	13
June	Lerderderg	11	74	13	17	2	4
Total		—	1191	223	232	264	27

A Victorian Naturalist in W.A.

by L. FELL

Eastern states naturalists coming to W.A. are sometimes in difficulty when it comes to getting unbiased information on whatever subject interests them. The writer has had the good fortune to travel through and collect from much of this state as far north as Wittenoom, and thought that a summary of his experience might be useful to others.

Climatic conditions

From Israelite Bay east of Esperance to Cape Leeuwin the climate within about 50 miles of the coast is a mild, temperate one, with rainfall of winter type, and in general, increasing going westwards and decreasing rather rapidly going north. Compared to Victoria the winter temperatures are mild, and the summer cool. This means that contrary to general belief, over most of this area there are wildflowers all the year round, particularly in the Stirling National Park and along the coastal strip from 60 miles east of Albany to beyond Esperance.

From Norseman, north through Kalgoorlie, Leonora and Wiluna, summers are hot to very hot, but the writer has been through that country in March and seen many wildflowers and flowering shrubs. It is best, however, in July and August. North of the Tropic the rainfall comes in summer and the vegetation is at its best in late autumn.

Information

Official information is usually vague and uninformed. The most accurate information comes from individuals in the various districts and organizations like the W.A. Society for Growing Wildflowers. The King's Park people have a great fund of knowledge which is available. It is essential for botanists to have *West Australian Plants* (Beard) and *Wildflowers of W.A.* (Gardner). For the specialist there is Rica Erickson's book on stylidiums and other species. The standard reference series *How to Know W.A. Wildflowers* (Blackall & Grieve) is almost beyond anyone but a trained botanist. An ornithologist needs a very good book, *Birds of W.A.* (Serventy & Whittell). There is, unfortunately, no branch of the Bird Observers Club in W.A., but ornithologists can be contacted through the W.A. Naturalists Soc. Insects are fairly well catered for by the *Jacaranda Pocket Guide* series.

Accommodation

Along the South coast accommodation is slowly improving. At Esperance there are motels, but no good eating places. From there to Albany, 300 miles west, there is a small hotel at Hopetoun (30 miles south of Ravensthorpe on the Highway), from which access is available to the Mt. Barren area. From Jerramungup, one can turn south to Bremer Bay, about 70 miles, and a fair camping area.

It is 110 miles west to Albany where, except in holiday periods there is accommodation in a variety of grades. West of Albany along the coast there is no good accommodation until one gets to Busselton on the west coast, although there are a few beaches with second rate caravan parks and camping areas. R.A.C. members will shortly be able to get a guide to graded caravan parks and hotels. Do not expect to get cheap accommodation. There is a very sketchy camping area in the Stirling National Park. If the traveller is self-contained and can camp without a caravan, he can stop anywhere and go on most roads. The R.A.C. has an office in Kalgoorlie and in Albany, where a great deal of information can be obtained.

Preston Junior Field Naturalists Club

This keen group of young people have been meeting on the first Friday of each month since 1965. They have had expert guidance through the willingness of a few F.N.C.V. members.

Now they have formulated their own constitution, and are "going it alone", still with some guidance from adults, who are encouraging them to organize and control their own meetings in the future.

In April of this year, Mr. Bruce Fuhrer lectured to the Club on "Fungi"; and in May, Mr. Nielson spoke on "The Geology of North-west Western Australia" with samples and coloured slides.

Mr. Ken Trotter gave a talk and practical demonstration on the preservation and storage of natural history specimens at the June meeting; and the following month, Mr. Peter Kelly gave a talk about collecting and mounting insects.

From this it is apparent that some F.N.C.V. members are giving support to this Club.

The Preston Juniors are producing their own Newsletter, and each issue contains notice of coming meetings, reports of past meetings, and a short article on some aspect of natural history. The members are being encouraged to contribute to the Newsletter.

Members are also exhibiting a number of specimens at each meeting. And at the recent Wild Flower and Nature Show, the Preston Juniors organized the exhibit featuring the "Native Mammals to be found around Melbourne". In fact, this Club contains tremendously keen members, a loyal nucleus of adults, and a potential to become an active centre of natural history for the northern suburbs of Melbourne.

However, they need a great deal more personal support from individual members of the F.N.C.V. Any person, I am sure, would be made more than welcome to attend during one of their monthly meetings.

General Information

The Club, which has now been going three and a half years, meets on the Friday of every month (except January) in the Rechabite Hall, 251 High St., Preston, at 8 p.m.

COMMITTEE

President: Mrs. Z. Lee.
Vice-Presidents: Mrs. Robertson, Master Howard Geary.
Secretary: Mrs. E. Tenner.
Treasurer: Master John Briggs.
Publicity Officer: Mr. P. Kelly.
Committee: Mrs. Fox, Master Clive Fox, Miss Robyn Tenner, Miss Susan Robertson, Master Russell Binion.

The above Committee was elected in March this year and a constitution was submitted at the following meeting in April. The constitution was adopted and the annual subscription of 60 cents was set at this meeting.

Membership

Membership continues to show a small but steady increase with about 25 members and 12 adults attending meetings. The age of members ranges from 8 to about 15 and interests are wide but seem to favour geology and mammals.

Newsletter

A monthly newsletter is posted to members immediately prior to each meeting. Edited by Mr. P. Kelly it contains information about the forthcoming meeting, a summary of the previous meeting, nature notes and other news items.

Wanted—Victorian Naturalists

The Division of Wildlife Research Library, CSIRO, Canberra A.C.T. Australia 2601, is lacking the following parts of the *Victorian Naturalist*.

Vol. **1** (1 and 2) 1885; **2** (3-7, 9-11) 1885/6; **3** (10) 1887; **4** (1-4) 1887; **5** (4, 6, 9) 1888/9; **8** (2 and 3) 1891/2; **9** (2, 3, 5) 1892; **33** (7-9, 11, 12) 1916/7; **40** (5, 8, 10) 1923/4; **41** (3, 4, 12) 1924/5; **42** (1-6, 8-10, 12) 1925/6; **43** (1-5, 7, 10) 1926/7; **44** (7, 8) 1927; **46** (2-4, 7) 1929/30; **47** Index, 1930/1; **48** Index, 1931/2; **49** (12) 1932/33; **50** (12) and Index, 1933/4; **51** (8) 1934/5; **53** (12) 1936/7; **55** (5) 1938/9; **68** (4, 8) 1951/2; **69** (10) and Index, 1952/3; **70** Index, 1953/4.

If any members are able to help with this request, please contact the Librarian, C/o the above address.

Field Naturalists Club of Victoria

List of Affiliated Clubs in Victoria

Ararat Field Naturalists Club, C/o Z. Banfield, 7 Lidar St., Ararat 3377.
Bairnsdale Field Naturalists Club, C/o E. V. Barton, 15 Turnbull St., Bairnsdale 3875.
Ballarat Field Naturalists Club, C/o Mr. E. Cummins, 319 Raglan St., Ballarat 3350.
Bendigo Field Naturalists Club, C/o Mr. J. Ipsen, "Maota", 15 Smith St., Bendigo 3550.
Colac Field Naturalists Club, C/o Mr. R. M. Missen, "Flowerfield", Beeac via Colac 3251.
Creswick Field Naturalists Club, C/o H. L. Barclay, Raglan St., Creswick 3363.
Geelong Field Naturalists Club, C/o Mr. G. McCarthy, 26 Fairbrae Ave., Belmont 3216.
Gould League of Bird Lovers, State School No. 1886, Lithgow St., Abbotsford 3067.
Hamilton Field Naturalists Club, C/o Mrs. M. Corrick, P.O. Box 53, Hamilton 3300.
Horsham Field Naturalists Club, C/o Mrs. C. Kroker, Kia Ora, Horsham 3400.
Field Naturalists Club of King Island, C/o I. G. Paterson, "Long Ridge", Currie, King Island.
La Trobe Valley Field Naturalists Club, C/o J. Belgraver, 179 Lloyd St., Moe 3825.
Lorne League of Bush Lovers, C/o Mr. J. S. Hayes, Box 31, Lorne, 3232.
Maryborough Field Naturalists Club, C/o Mrs. L. Courtney, Carrick St., Maryborough 3465.
Native Plants Preservation Society, C/o Miss W. Waddell, 3 Denham Pl., Toorak 3142.
Peninsula Field Naturalists Club, C/o Mrs. Marriott, 120 Fortesque Rd., Seaford 3201.
Portland Field Naturalists Club, C/o Miss J. W. Lineker, 40 Must St., Portland 3305.
Ringwood Field Naturalists Club, C/o Mr. G. Coutts, 37 Ronald St., Croydon 3136.
Robinvale Field Naturalists Club, C/o Miss J. E. Phillips, Consolidated School, Robinvale 3549.
Sale Field Naturalists Club, C/o Miss C. D. Tomlinson, P.O. Box 46, Sale 3850.
Save the Dandenongs League, C/o Miss M. Moon, "Kakirra", Kalorama 3766.
Stawell Field Naturalists Club, C/o Mr. N. S. Bennett, Box 10, Stawell 3380.
Sunraysia Naturalists Research Trust, P.O. Box 763, Mildura 3500.
Traralgon Field Naturalists Club, 4 Charles Street, Traralgon 3844.
Warragul Field Naturalists Club, C/o R. W. Reid, 5 Elizabeth St., Warragul 3820.
Warrnambool Field Naturalists Club, C/o Mrs. S. W. Alford, Grasmere 3279.
Wimmera Field Naturalists Club, C/o Miss A. M. Jordan, "Lister Vale", Kiata 3415.

General Meeting—9th September

Approximately 150 members heard the President open the meeting, when he announced the passing of Mr. Ernie Snell, a keen Microscopy Group member.

The minutes of the August meeting were taken as read on a motion from Mr. Swaby. Thanks were given to Mr. McInnes for his organizing of the Nature Show, and he reported that attendance figures were lower this year because of it coinciding with the Art Centre opening week.

New members as listed in the *Vict. Nat.* were elected.

The speaker for the evening, Mr. J. H. Willis, being so well known, needed no introduction to members; and he began by mentioning that the last time the F.N.C.V. had an address on New Zealand was in 1948, by the late Mr. Fred Lewis, Chief Inspector of Fisheries and Game, on "3000 miles through New Zealand". Mr. Willis said that it was a pity, because our "sister Dominion" is a land of tremendous contrast when compared with our own environment.

New Zealand has no snakes, no marsupials, no carnivorous mammals, a poor representation of avifauna with the exception of some sea birds along the coast, and very few frogs. No mosquitos were noticed during Mr. and Mrs. Willis' trip; and there are no wattles or gum trees (except those which have been planted); whereas these two groups are the two largest plant groups on the Australian mainland. There are no members of the Protea family—Australia has about 700 species.

The speaker said that after listening to this, you might well ask—"What *has* New Zealand got?".

Well, to begin with, it has mountains twice as high as the highest in Australia, active volcanos and geysers without parallel this side of the Tasman Sea, and dramatic scenery centred around the volcanic or thermal region of the North Island.

In the plant world are a number of varieties which are poorly represented in Australia. There are hosts of Gentians, Buttercups, Willowherbs, Aciphylls, Hebes, and about sixty different kinds of Celmisia or Silver Daisy of which we have only three for the whole of Australia.

When comparing the two countries, they are so entirely distinct; although separated by only 1200 miles of sea. Mr. Willis said that the time at his disposal, to bring away impressions and absorb as much of the country as possible, was twenty days—nothing like the five months of Mr. Lewis.

He channelled his remarks in five chief directions—

(i) The towns, because these are the first parts of a country to be seen.

(ii) Islands and Peninsulas, of which there are quite a variety in New Zealand.

(iii) The Kauri forests of the far north.

(iv) The thermal regions (the most exciting part of the trip).

(v) The high mountains, terminating with Mt. Cook, the highest point of the Dominion.

The above five elements were portrayed with some excellent color slides, projected by Mr. Alan Morrison.

The first of these showed the City of Auckland, situated towards the north end of the North Island, with a population of nearly half a million. It reminded one of a "little Sydney"—being always in sight of sea or mountains. The Waitakere Range behind Auckland, almost corresponds to the Dandenongs and Melbourne in distance from the city and in height. A number of names in New Zealand begin with "Wai", which means "water" in Maori.

The city of Auckland is spread out over a series of little volcanic cones, originally used by the Maoris as fortifications during battles. Some of these were shown on the screen.

Turning in the opposite direction, the island of Rangitoto may be seen in the distance.

The museum in Auckland is the largest in the Dominion, and includes the Herbarium which houses the famous collection of Cheeseman, the "grand old man" of New Zealand botany.

Higher up in the Waitakere Ranges at about 1500 ft., tree ferns (*Cyathea medullaris*) grow to the edge of the roadway, and exhibit their remarkable jet black trunks and frond-bases; while the Hard-water Ferns with longer and more finely divided fronds than the Australian variety, hang like a green filmy curtain by the roadside.

The slides "took us" through Wellington where the wind reaches very high

velocity—120 mph being recorded last April. The "Wahine" was wrecked during this gale.

We then "visited" Lyttelton, the chief port of Christchurch in the South Island. Lyttelton was the first settlement of Christchurch; and now, a tunnel 1½ miles long joins the two. In the Christchurch museum, a model is to be seen of the comparative sizes of the giant moa and man. This huge bird stood 12 ft. to 15 ft. high; and became extinct just prior to white man landing in N.Z. Rainfall in Christchurch is about 35 ins. annually, and in parts of the Canterbury Plains it is only about 15 ins.—a very low rainfall for a place so far south. Rainfall provides another contrast in N.Z., for it can vary within a few miles from 15 ins. to 300 ins. per year. It is interesting to note that 12 to 15 sheep per acre are carried on these Canterbury Plains, compared with 1 or 2 per acre in Victoria.

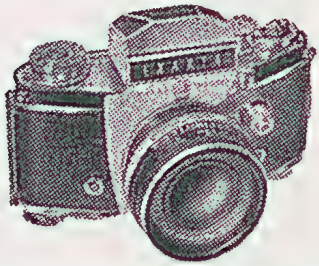
The second segment of the talk took us to a typical peninsula, Bank's Peninsula, extending about 20 miles out to sea. On this is the town of Akaroa—of historical note—because it was the first settlement on the South Island. It was settled not by the British, but the French in 1840. The hills have been cleared for farmlands, and include some very steep sections. The effect of gales was evident in the slides shown of trees near the upper slopes of the hills. One tree was bent to a complete right angle.

Rangitoto Island consists of entirely black pumice—no soil. And yet the whole island is covered with dense forest. It is thought by geologists that the last eruption took place only 300 years ago; therefore the whole of the forest cover there is 300 years old or less.

It is quite odd to see mangroves growing not in mud, but on this solid basaltic rock. The island is a permanent reserve, and on the whole is attended very well.

The Maoris were quite well versed in botany, in constrast to our Aboriginals, and even had an appreciation of botanical classification. This is evident from the large number of vernacular names of plants bearing Maori names.

In this area, examples were shown of the Daisy Bush (*Olearia furfuracea*), Kidney Fern, Astelia (normally epiphytic, but also growing here on the black pumice), the *Peperomia*, and Alpine Lichen and Moss (both of which were also growing near sea level).



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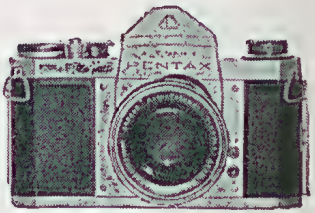

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The next move was to the Kauri forests in the north-west of the North Island. These forests have been ruthlessly cut, and the timber wasted over the years, so that only a token percentage remains. 20,000 acres are to be retained in the heart of the Waipoua Kauri forest.

The speaker said that to stand off and look at some of these giant pines was awesome. Two slides were shown, one of the "Father of the Forest" and the other of the "God of the Forest"; and both the trees were 1500 and 2000 years old respectively. The former was the largest found to date, being 25 ft. in diameter at the base, and 150 ft. high. Clumps of Astelia grew at every limb and trunk junction.

From the forests of the north, members were "taken" to the thermal regions of the island. They were told that Rotorua blew up in ±120 A.D., and a layer of ash one foot deep covered the north of the North Island. Slides showed the columns of hard volcanic ash remaining, after erosion of the surrounding area. Also shown were volcanic lakes, with Seagulls on the shores of Lake Rotorua amidst the perpetual smell of sulphur, from the jets of steam about one's feet. Geothermal power is obtained from this area to generate electricity.

At Rotorua Gardens, slides were shown of Cryptomerias, ornamental volcanos (in place of fountains), a model Maori village, and Spotted Trout swimming at a depth of 7 feet, the water of Paradise Valley Springs being so clear. Also seen were "The Boiling Lake", Cathedral Terraces (colorful due to iron and copper compounds), the webs of a spider (*Dolomedes minor*) looking like silken bags attached to the grasses, and the Waikato River (longest in North Island) with Toi-Toi (Pampas Grass family) growing along the banks.

Mr. Willis concluded with his visit to the highlands, and although upset by untimely rain on his arrival at the Chateau, he never-the-less obtained some fine photographs of two lenticular clouds (formed at high altitude by a whirling high velocity wind), aerial views of the system of fan-deltas towards the base of the Alpine regions, Mt. Cook (over 12,000 ft.) with permanent snow, the Mueller Glacier in the Hooker Valley (named in 1895 after Baron F. von Mueller), and many plants including the Wild Spaniard (*Aciphylla colensoi*), *Hebe salicifolia*, Mountain Totara (*Podocarpus nivalis*), Mt. Cook Daisy, Mt. Cook Lily, and Russell Lupins growing wild.

The Tasman Glacier and its treacherous crevasses were shown, and the last slide showed the Tuatara Lizard, a living fossil having affinities with the saurians of the Triassic period. It is found only on two small islands off the North Island.

Mr. Willis was thanked by the President and applauded loudly by members.

In response to questions Mr. Willis said introduced pests in the South Island of New Zealand contributed to erosion on the cleared high slopes. These included deer, goats and rabbits while possums prevented the regeneration of some trees.

The Secretary announced that he had received a letter saying that the Rhyll (Nits) area on Phillip Island would not have a hotel-motel. He also mentioned a letter telling of the appearance of many satin bower-birds at Wandiligong, making bowers, taking silver leaf holly leaves, destroying flowers and pecking oranges.

Mr. W. Woollard recalled flocks of them at Mitta Mitta years ago coming right to the vegetable gardens.

The President said that Council has the power to grant honorary membership of the club after 40 years membership or for outstanding work and serving the club well. They had now conferred the honour on Mr. J. H. Willis, who had been editor of the *Victorian Naturalist* from 1948 to 1951, Government botanist since 1961. He had served the club well and was available for advice, had given talks on many occasions and had received the Naturalist Medallion in 1961. In accepting the honorary membership certificate Mr. Willis said he was overwhelmed and speechless and accepted the honour with pleasure in knowing the spirit in which it was given.

Mr. Allan said that he and the Secretary had been to Wychitella and had seen a Lowan nest in working order—not in sand but in gravel. The bird must have had trouble scratching the bigger stones away. The central part had fine grains and vegetable matter. They brought a specimen block of rock from a gully in the area where there had been gold panning 40 or 50 years ago.

The Secretary announced that the Prahran Library was showing free films on 19th September—"Blueprint for the Future", "The role of the Aboriginal", etc., and on 17th October "Carpets of Central Asia". He also announced that Mr. and Mrs. E. Hanks had given a dona-

tion of $100 to the club. This was acknowledged with warm appreciation by the members.

Miss L. Young sent a newspaper cutting that a pipeline in England had been diverted to avoid disturbance of insects and fungi.

Paintings of native flowers by Amy Fuller were displayed. Mr. A. J. Swaby showed a specimen of *Acacia spinescens* which illustrated the ultimate reduction of leaf surface which begins as a feathery leaf followed by a phyllode and in this acacia the stem only may take the place of the leaf and it ends in a spine. If grown in a garden with sufficient water it grows phyllodes. He also showed the Jumping Jack Wattle, *Acacia enterocarpa*, with long slender branches and a short pod showing a zig-zag design. He brought also a flowering spray of raspberry Grevillea, *Grevillea confertifolia*, found only in the Grampians, West Victoria Range, and Moora Moora. In bud it looks like raspberries.

Mr. P. Curtiss showed a Sturts Desert Pea (*Clianthus formosus*) coming into flower after surviving the winter—protected from frost under a tree. As the days lengthened, so did the branch.

Mr. Ian Morrison brought specimens of the Morel fungus *Morchella conica* from Black Range near Stawell and Birds Nest fungi—*Nidula emodens*—from the Grampians.

The Secretary announced that Frankston F.N.C. had changed the name to Peninsular F.N.C. He had received a report from the Mammal Survey Group.

The Crosbie Morrison Memorial Lecture will be given at the Pharmacy College on Friday 11th October.

The Tourist Bureau sent 600 leaflets advertising the Excursion to Bendigo on the 19th and 20th October when the Bendigo Field Naturalists and Bird Observers would help to entertain the visitors.

Mrs. Woollard praised the wonderful exhibition by the Juniors at the Nature Show. The President also commended the leaders for staging such a show. Mrs. Woollard stressed that they work as a team.

Miss Jean Blackburn announced the Annual Meeting of the National Parks Association on 25th September when slides will be shown by members at the Herbarium.

Botany Group Meeting

12th September

Twenty-nine members attended and Mr. Fairhall presided. Mr. J. Willis gave a very interesting and informative talk on "Historical Aspects of the Mallee Flora", in which he traced the development of the Mallee from its beginning 100 million years ago when the present lower Murray and Darling area was under the sea. Then followed the uplift of south-eastern Australia when the Murray and Darling area was raised above sea level. The climate became colder and wetter, and there were large freshwater lakes (such as Lake Nawait), and mighty rivers formed. The vegetation was luxuriant and giant marsupials abounded. Twenty thousand years ago the glaciers vanished and the aboriginals came down through New Guinea over the land bridge which existed, bringing with them the dingo. Five thousand years ago the area dried up, some plants became extinct and there was great aridity. Later the rainfall slowly increased and the Mallee eucalypts moved in, possibly from the Flinders Ranges. The aboriginals lived in harmony with their environment, but white man, with his arrival 100 years ago, had a catastrophic effect on the natural vegetation. He brought the rabbit, noxious weeds, overstocked with sheep, and used chemical pesticides to

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eliminate the pests he had introduced, making the future of the Mallee flora very doubtful. Mr. Willis felt that the Sunset Country should be kept intact in order to preserve as much of the Mallee flora as possible.

Knowledge of the flora of the Mallee region began with the exploratory journey of Baron von Mueller (1853), followed by many others, such as William Lockhart Morton (1861), Mrs. Helena Ford (of Wentworth), J. Bracebridge Wilson, J. D. O'Donoghue (author of articles in "Victorian Naturalist" in 1915 and 1916, "Wanderings on the Murray Floodplain" and "Rambles in The Raak"), and H. B. Williamson. Mr. Willis first visited the Mallee in 1937, in the company of Mr. Walter J. Zimmer, author of "The Flora of the Far North-west of Victoria", published as Bulletin no. 2 by the Forests Commission of Victoria. More recent contributors of specimens from the Mallee to the National Herbarium have been, among others, Mrs. Eileen Ramsay (of Redcliffs), Miss Jean Galbraith and Mr. Cliff Beauglehole.

Excellent colour slides illustrated the talk, at the conclusion of which Mr. Fairhall thanked Mr. Willis on behalf of members, who were enthusiastic in their appreciation. The opininion was expressed that the full text of the address should be published in due course in the *Naturalist*.

Miss M. Lester gave a constructive report on the successful Botany Group exhibit on "Rushes and Sedges" at the recent nature show, and Mr. J. Baines briefly reported on a visit to Sydney, referring to the specimens in the herbarium there collected by Banks and Solander at Botany Bay in 1770, and to visits to Royal National Park, Kuring-gai Chase, and Stony Range flora reserve at Dee Why.

Arrangements were made for an excursion to Stony Point on Sunday, 13 October, led by Mr. T. Sault.

Botany Group Meetings

Thursday, 10 October—Miss L. White: "Which Generation?".

Thursday, 14 November: Miss Helen Aston: "Botanical Terms and Keys made easy."

Geology Reports

August—

Twenty members attended with Mr. Davidson in the chair. The Subject for the evening was a talk by Mr. G. Carlos, Lecturer in Geology at Melbourne University, on Dia-Thermal Deposits. The speaker explained what happens at the base of Geo-synclinal structures. Compression and generation of heat causes great molecular activity. Various minerals are formed at reducing temperatures. He said sometimes metallic minerals are forced into zones of structural weakness, and quoted the Saddle Reefs at Bendigo as an example. He also spoke of the migration of aqueous solutions carrying minerals. Sometimes large concentrations are precipitated in this manner. The speaker said whilst most metallic minerals originate from a Thermal state, there are exceptions. Bog Iron Ore, for example, is formed by bacterial action on Iron Sulphide. The Chairman thanked Mr. Carlos for a very interesting and instructive talk.

EXHIBITS

Mr. Dangerfield: Turquoise, Whitfield. Actinolite, N.E. Victoria.

Mr. Wigmore: Banded Hornfels, Scheelite, Molybdenite, Biotite, Actinolite Hornfels, Garnet, and Pyroxene Hornfels, all from King Island.

September—

Twenty-five members and visitors attended with Mr. Dodds taking the chair, in the absence of Mr. Davidson. The evening was devoted to films. Three films were obtained from the State Film Library. The first, (Mineral Prospecting) dealt with the modern methods used—Geological, Geo-physical, and Geo-chemical. The second was a Russian film called (The beginning of Life). It dealt with the possible origin of lviing organisms on Earth under natural conditions, and also the production of living organisms by artificial means in the laboratory. The third film was of an expedition to "Paracutin"; a Volcano in Mexico. A reconnaissance by helicopter showed the active volcano just after the peak of its fury, with lava being pushed down its side, and ash and smoke belching thousands of feet in the air.

EXHIBITS

Mr. Wigmore: Native Copper, Munganna Nth Q'ld. Cinnabar, Elizabeth Ck. Atherton Tableland Q'ld.

Mrs. Salau: Blue Tiger Eye, Wittennoom Gorge W.A.

Miss Pertinac: Agate, Opalized Wood, Nth N.S.W.

Mr. Box: Tourmaline Granite, King Island.

Mr. Sault: Section of Brecciated Basalt, Hornsby N.S.W. (under Microscope). Section of Iddingsite Basalt, Coimadai, (under Microscope).

Marine Biology and Entomology Group

5th August

Mr. Condron took the chair; 21 members being in attendance.

Mr. McInnes reported that he had made enquiries re obtaining a female Lyre Bird for the forthcoming Nature Show, and believes that there could be one at the museum at Tynong. Mr. Condron said that he would contact a friend there, in the hope that more information can be obtained.

Exhibits:

Mr. Condron: Some lerp scales which were on a gum leaf. Placed under a low-power stereoscopic microscope, these proved to be of great beauty. Also two cabinet drawers of insects; one American Hawk moths and the other Australian moths of mixed families.

Mr. McInnes: Some rotifers shown under his microscope, and a species of protozoan ready to divide. These were taken from his pond.

Mr. Trotter: A line mole cricket, and a species of Longicorn beetle which he had obtained at Woori Yallock. Also under his stereoscopic microscope several varieties of foraminifera from the late Mr. Tindale's collection. These had been taken from Port Phillip Bay.

Mr. Setford: Some leaf-hoppers which he had collected at Frankston, also a stick insect from Toorak about six inches long, which Mr. Condron identified as *Ctenomorpha marginipennis* (female). Some discussion then took place re colour of stick insects.

Mrs. Strong: Several species of fresh-water clams from the U.S.A., several of them with a brilliant pink nacre. Also a Murese shell from Pt. Hedland, W.A., a deep water pectin from the Everglades, Florida; a fairly rare "Pelican's Foot" shell from U.S.A., and a beautiful stromb from Mexico.

September 1968

This meeting was chaired by Mr. Condron, 18 members being present.

Congratulations to Miss Jenny Forse on attaining her majority were made by the chairman, this was heartily applauded by all members.

Mr. Condron gave a short report on the trip to Doncaster made by members on Saturday 24th August, for the purpose of collecting pond life for the Nature Show. This excursion was quite successful; a good variety of specimens being obtained. Mr. McInnes gave a talk on the Nature Show, and said that although attendance did not equal last year, the Show was a great success.

Mr. McInnes was congratulated by Mrs. Strong on behalf of the Group on the stalwart job he did in organizing the Show, members showed their appreciation in the usual way.

Mr. McInnes congratulated Mrs. Strong on the success of the bookstall sales.

Mention was also made of the excellent manner in which Mr. Morrison carried out his duties as Officer-in-Charge.

Dr. Brian Smith, Curator of Invertebrates, National Museum, was also congratulated on his excellently arranged show-case of Victorian sea-shells, kindly loaned by the National Museum. These created much interest to the public.

Exhibits:

Miss Jenny Forse: Some *Concostracans*, a species of fresh-water crustacean, which she had collected in the Broken Hill area. Miss Forse gave a short talk on this crustacean and explained that the carapace was composed of two sides resembling the two valves of a bivalve. They are by no means common, being sporadic in their appearance.

Mr. Condron: A case of Hawk moths and some line water beetles. He explained that the latter were very voracious. Some water bugs, the female of this family deposits her eggs on the back of the male. A male and female Bird Wing butterfly. Mr. Condron gave a short talk on the variety of colours found in the male of this species according to locality. The two shown were from the Solomon Islands, the male being blue. The most common one on the mainland of Australia is green, and there is also an orange variety, or sub-species.

Mr. McInnes: A mixed variety of protozoa under his microscope, taken from his pond, these included, amoeba, flagellates, ciliates, and paranaecium.

Mr. Strong showed a microscope slide made by Mr. Eyre Swarbreck in 1941, of cross sections of sea urchin spines, this slide had been shown at the Nature Show, and by the beauty of its form and colour had created great interest.

F.N.C.V. DIARY OF COMING EVENTS

GENERAL MEETINGS

Monday, 14 October—

1. Minutes, Reports, Announcements.
2. Correspondence.
3. Subject for the evening "Look into these Flowers": Mr. A. Swaby.
4. New Members

   (a) *Ordinary*:

   Mr. Leigh Winsor, Flat 1, 4 Langford St., Surrey Hills 3127. (Interest—Geology.)
   Mr. Chris. Johnson, 250 Dandenong Rd., East St. Kilda 3182. (Interest—Conservation and Botany.)

   (b) *Junior:*
   Miss Heather Ogilvie, 14 Morell St., Burwood 3125. (Interest—Geology.)

   (c) *Joint Ordinary*:
   Mr. & Mrs. D. J. Little, Flat 4, 27 Gladwyn Ave., East Bentleigh 3165.

5. General Business.
6. Nature Notes and Exhibits.

Monday, 11 November—"Caves and Caving". Mr. Ellery Hamilton-Smith.
Monday, 9 December—"Wildflowers of the North". Mr. A. Morrison.

GROUP MEETINGS

(8 p.m. at National Herbarium, unless otherwise stated)

Wednesday, 16 October—Microscopical Group. Mr. P. Genery will exhibit a film (Movement Within the Living Cell) with annotations.

Friday, 25 October—Junior meeting at 8 p.m. at Hawthorn Town Hall.

Friday, 1 November—Junior meeting at 8 p.m. at Rechabite Hall, 251 High St., Preston.

Monday, 4 November—Entomology and Marine Biology Group meeting in Mr. Strong's rooms in Parliament House. Enter through private entrance at south end of House.

Wednesday, 6 November—Geology Group.

Thursday, 7 November—Mammal Survey Group.

Thursday, 14 November—Botany Group.

F.N.C.V. EXCURSIONS

Saturday-Sunday, 19-20 October—Weekend excursion to Wychitella Forest. Leader: Mr. I. O. Maroske. The coach will leave from Flinders St., outside the Gas and Fuel Corporation at 8.30 a.m. an hour earlier than the usual time on day excursions. Bring a picnic meal for Saturday and two meals for Sunday. Cost for coach and dinner, bed and breakfast at the Charlton Motel is $12 per person; any money still owing should be paid by the October meeting, cheques being made out to Excursion Trust.

Sunday, 20 October—Belgrave. Leader: Miss Mavis Conway. Take 9.12 a.m. train to Belgrave and meet at top of ramp. Take a picnic lunch.

Tuesday, 5 November (Cup Day)—President's picnic to Phillip Island. The coach will leave Batman Avenue at 9.30 a.m., fare $2.20. Bring two meals. We plan to stay for the penguin parade so a torch may be useful.

Preliminary Notice

26 December to 1 January—Traralgon. Accommodation has been booked at a Traralgon Motel and the party will may day trips to places of interest, such as Mt. Erica, Walhalla, Tarra Valley, etc., in conjunction with the Latrobe Valley F.N.C. The coach fare will be $16.00 and should be paid by the end of November, cheques being made out to Excursion Trust. Price quoted by the motel is $5.00 for Bed and Breakfast and the evening meal is available *à la carte* in the dining room. Motel charges to be paid individually, but bookings made through the Excursion Secretary.

Field Naturalists Club of Victoria

Established 1880

OBJECTS: To stimulate interest in natural history and to preserve and protect Australian fauna and flora.

Patron: His Excellency Major-General SIR ROHAN DELACOMBE, K.B.E., C.B., D.S.O.

Key Office-Bearers, 1968/69

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Vice-Presidents: MR. JEFFS, MR. T. SAULT

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Hon. Treasurer: MR. D. E. MCINNES, 129 Waverley Road, East Malvern, 3145 (211 2427)

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Hon. Librarian: MR. P. KELLY, c/o National Herbarium, The Domain, South Yarra, 3141.

Hon. Excursion Secretary: MISS M. ALLENDER, 19 Hawthorn Avenue, Caulfield 3161.

Subscription Secretary: MRS. N. E. LEWIS, 1 Billing Street, Springvale 3171. (546 4649).)

Sales Officer: MR. B. FUHRER, c/o National Herbarium, The Domain, Sth. Yarra.

Group Secretaries:

Botany: MISS M. BUTCHART, 23 Loch Street, Hawthorn East 3123 (82 1616).

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Microscopical: MR. M. H. MEYER, 36 Milroy Street, East Brighton (96 3268).

Mammal Survey: MR. P. HOMAN, 40 Howard Street, Reservoir 3073

Entomology and Marine Biology: MR. J. W. H. STRONG, Legislative Council, Parliament House. Melbourne, 3002.

MEMBERSHIP

Membership of the F.N.C.V. is open to any person interested in natural history. The *Victorian Naturalist* is distributed free to all members, the club's reference and lending library is available, and other activities are indicated in reports set out in the several preceding pages of this magazine.

New Rates of Subscriptions for 1968

Ordinary Members	$7.00
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The cost of individual copies of the **Vict. Nat.** will be 45 cents.

All subscriptions should be made payable to the Field Naturalists Club of Victoria, and posted to the Subscription Secretary.

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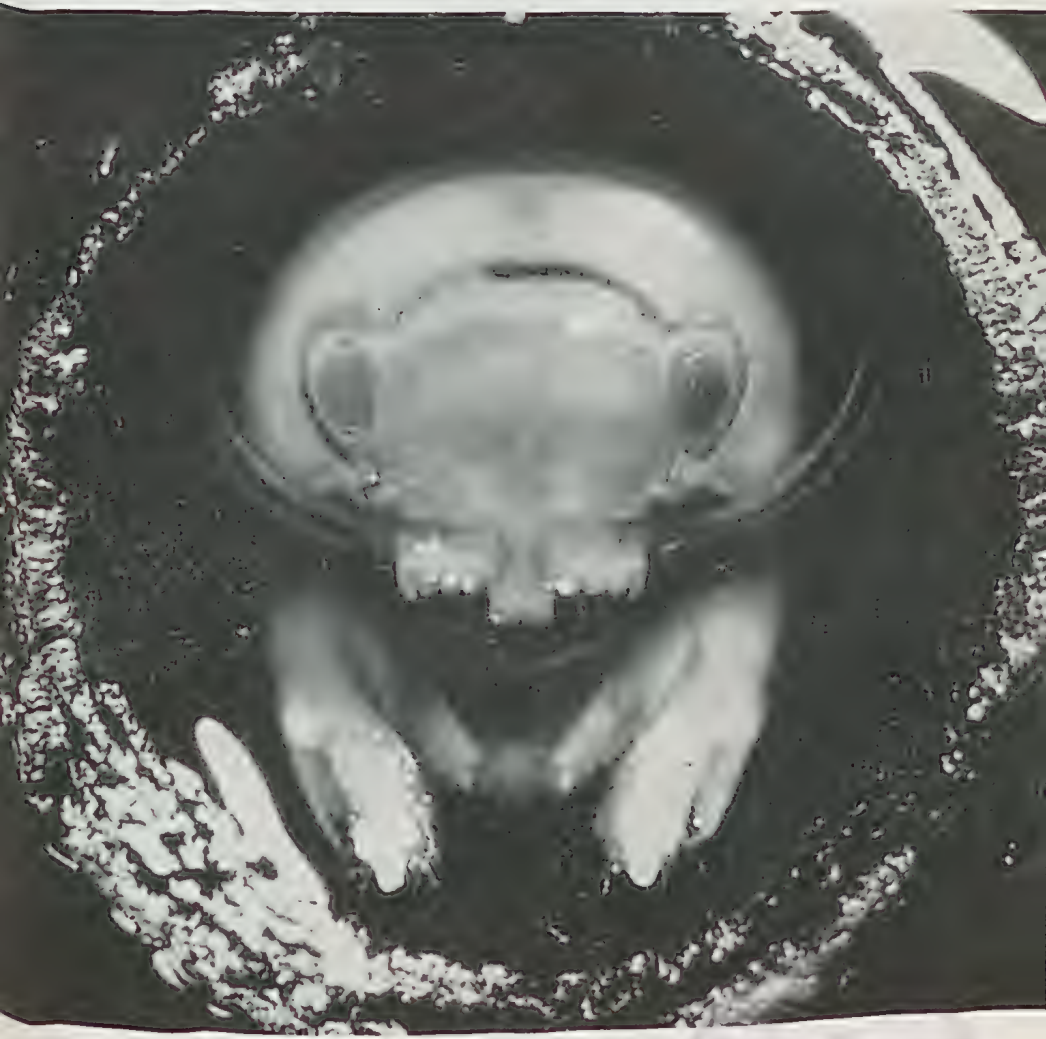

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Editor: G. M. Ward
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F.N.C.V.

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Front Cover:

With ventures into space of recent months, and probable manned flights around the moon hinted at, one may be forgiven if the photograph is wrongly interpreted as being a creature from space. In fact, however, it is a member of a large family here on earth, photographed from an unusual position. For details, read the next issue of the *Victorian Naturalist.*

Wyperfeld Revisited — A Sequel

by Victor Jacobs

Barely four months had elapsed since our previous visit, and here we were back at Wonga Hut in January 1968. Alan, who should have been here with us in our efforts to determine the unknown honeyeater, had succumbed to sickness and could not come, but Simone came, and also my brother. We had not seen each other for a decade and a half, and he was visiting us on his way back to England, from San Salvador via Narre Warren North.

The half inch or so of vegetation seen in September had now gone. Wonga Hut clearing was now a vast, flat dust pan, broken only by the gums and boxes, the toilets and shelter sheds, and at this hot moment in time by our van, and the car of the only other camper.

The daylight hours had been hot, cloudless and rather trying. Now at 11 p.m. the stars were visible and the windless air had a temperature of 86 degrees.

On 23rd January, at 5.30 a.m., the sky was clear and tinged with pink. The temperature was 72°, and the mosquitoes had been a nuisance during the night. Magpies, which previously were carolling, were now standing with heads cocked on one side listening, and ready to run and dig. The toilet block had every seep of water monopolized by bees—not hostile but eager for water. A large dead tree north of the toilet block was lit with many White Cockatoos, but only three Pink ones. Homo sapiens absent —other creatures present. I had not seen such a number of cockatoos so near before.

Two early workers eager to use the "cool" of morn were busy with a new scheme for the park. This latest venture was the erection of a fenced, corrugated galvanized sheeting catchment area of one quarter acre. A 5″ rainfall on the catchment area will net 26,000 gallons. A small shallow pool near to the toilets is fed by a hose and replenished by the same constructors who have their rewards when emus with their chicks make daily visits. Kangaroos too use this water. As recent showers had made some pools in the bush, the emus hadn't been for a day or two.

In the shelter shed a Welcome Swallow crouched near to its vacated nest. The concrete pool was popular with the birds that morning. I saw Spiny-cheeked Honeyeaters and Red Wattle-birds.

At 8.30 a few clouds appearing in the west gave a hint of a change, and we headed for Black Flat. We stopped to look for seedling cypresses in the Ararat High School plantation but located none. At Maiden Swamp an emu with three chicks ceased grazing and raced off. Seven more did likewise at Black Flat.

We parked the car at the usual spot, and with two compasses headed west, once again past the familiar pittosporums, and once again over the sand hills till we sighted Lookout Dune. Our aim was to see more of the honeyeaters which we saw in September, but after travelling less than

a mile from the vehicle, it became quite apparent that the birds were showing more discretion than the humans by avoiding the heat which was increasing steadily. (Later we learned that Melbourne recorded 105°). Attracted by the scarlet funicles around the seeds of Hakea Acacia we halted to collect seed. The continued drought was affecting some of the plants; Banksias under a foot in height were dying or dead, but the taller ones seemed to be very healthy. *Callitris verrucosa* had two colour forms: one was a silvery glaucous green; the other a bright yellowish green. Both forms of the species were suffering on this day, for their tips were drooping with lack of turgidity. A Grey Currawong called dolefully.

Conditions were rather unpleasant, for a gale force N.W. wind blew, while the ragged grey clouds piling up in the west tacked against it. I saw two birds which looked very much like Friar Birds, but they seemed so much out of context that I hesitate to claim that they were such.

We had been heading East for some time now and with watches indicating midday, reckoned that we should be at Black Flat. We did find a flat, with River Red Gums flanked by Black Box, but not the right one. Which way was Black Flat? All ways looked alike. Not a happy position to be in. A further move to the east led us to a track where we sipped some of our now not too plentiful water supply, and rested wearily, fanned by a hot wind and unpleasant thoughts. Simone was weathering the situation as well as we adults, if not better. This track, unmarked by car tyres may have been a fire break, but it looked more like a track so we followed it to the north. It soon began to peter out and we lost faith in it. Another rest and the water level went down again. The bees were thirsty too, and paying us visits to collect our perspiration. One, being trapped by my bent arm retaliated. The other two were careful not to trap any bees in this way.

The temperature must have been well over 110 degrees as we retraced our steps down the track, and pursued it farther south until indecision plagued us again and we halted to lie under a great Red Gum. My brother clambered up it without seeing the hoped-for view, and noticed while he descended that when a branch moved, the tree "squelched". With our ears to the trunk we listened, and were amazed to hear a gigantic squishing, sucking, gurgling noise inside. Was it the transpiration current? It sounded in full flood. Later, Simone, listening to trees in calm and windy conditions, considered that the sound was an amplification of the sound of leaves moving.

It was 5 p.m., and the temperature was still very high. We decided to retrace our steps into the dunes, find Lookout Dune, and attempt to find a better way out. Progress was slow and punctuated by increasingly longer stops. A few birds were about but we weren't in the mood for them. However, it reminded me that during the day we had surprised many quite large flocks of emus feeding in the dunes. At one of our stops, a great dark misty sheet of rain could be seen to the south. This was the 130 points falling on Rainbow in one mighty swish; the accompanying wind bending TV aerials and removing one roof... We mentally invited it towards us but all that came was a shower enough to dampen a hankie.

We sighted Lookout Dune and hopefully turned east again. We stayed as high as possible by skirting some ridges and saw Round Lake. A large flock of White-winged Choughs

moved off as we neared the lake. In our confused state we missed the markers and followed a track that led once again to anywhere but Black Flat.

It was 7.30 and too late for further movement. We scooped a shallow trench in a depression near a dune summit, and settled in for the night. The night was far from comfortably warm. Simone overcame the chill by periodically jumping out of the sandy bed and taking a short jog trot. My brother who had been dry retching, must have been wishing himself in England's more amenable climate. Having been a frequent judge in Outward Bound trials in Wales he couldn't understand how we had gone astray. I, while not sure we were going to escape from our predicament in this almost featureless area, was pondering over a better method of navigation.

Only a light wind blew that night and the sky was almost clear. At 2.30 a.m. a weak moon arose, and at 4 o'clock Venus gleamed in the rays of the as yet invisible sun.

We waited until the first light tinged the horizon, rose out of our sandy bed, drank the last dregs of our water, and headed over the dunes to find Round Lake. Fifteen minutes later as we sighted the lake, Simone saw the black head of a marker—a different type to the ones that we had seen in September. It was number 8. Number 7 was located, then 6, 5, 4, 3, 2, 1, and just over the rise, the car. A speedily prepared cup of tea was drunk and immediately the stomach revolted, as if having been prepared for an emergency situation, was not ready for such a treat.

Back we went to Wonga Hut. The other camper was relieved to see us, being aware that we had gone astray, and the catchment builder who had left a light burning all night, was also relieved. The rest of the day passed while we replaced lost liquid and food. The change had dropped the temperature into the low nineties, and a south wind made life more tolerable. In spite of all the liquid that I drank this day, I did not perspire again until Friday. The airy shelter hut was the coolest place, and there Rudd Campbell found us and stayed a while to chat. At the far side of the clearing White Cockatoos were snapping twigs and dropping them.

At dusk we sat near the concrete pool to watch events. Two Ringnecks were already in a tree alongside, when thirty-odd Red-backed Parrots flew to the pool momentarily before settling on the top of a rainwater tank. No Smokers came along. In fact these glorious birds so common usually, were not seen at all during this hot January spell. Two Eastern Rosellas came to the pool via the tree, but didn't drink. In the fading light, kangaroos came from all directions, but realizing that strangers were there, all but one braked and curved in graceful retreating parabolas towards the trees. They move easily; the power of the strong thigh muscles being efficiently transmitted through comparatively small feet to the ground, enabling easy jumps of fifteen to seventeen feet to be made. One shy kangaroo was more determined or thirsty, and after five more minutes reached the pool, where it spent ten more minutes alternately drinking and watching us. At any time after dark, if one went near the toilet block, the sudden drumming of feet would indicate their rapid departure. A cautious approach with a flashlight would allow one to see them drinking. In spite of the lack of vegetation, which had caused a drop in the number of these animals in the park, and a

restriction on recent births, the remaining animals were extremely healthy and robust, although water is available at a number of pools in the park, kangaroos, unlike emus, will not travel much over a mile to partake of it, preferring to obtain it from a diet of roots and occasional grasses.

On Friday, having recovered from the previous trying Wednesday, I took a stroll into the dunes. A Grey Butcher-bird was delicately dissecting and eating a lizard. Yellow-rumped Minas and Crested Wood Pigeons were in the wood, and a Wedge-tailed Eagle was sailing on-high.

In the next hollow, two adult and two juvenile Magpies were trotting hither and thither feeding. Another magpie flew by at an elevation of about sixty feet. All four birds on the ground called, but whether by way of invitation or warning, the passer by took no heed. In the same clear valley three large kangaroos (one of which had a mark like a convict arrow on the forehead) stopped feeding when they sensed me and did not resume for six minutes. There I searched for the golden ranks of the Hibbertia seen in September, but found neither gold nor green. The only flower found that January was *Helichrysum baxterii*. The gold and white papery blooms of this everlasting were very dense just to the left of the turn off from Wonga Hut to Lake Brambrook.

The other camper was about to leave, so we farewelled him and took a drive to Eastern Lookout. The scale-affected young Weeping Pittosporums were much blacker. Kangaroos were still about on the plain and amongst the trees. We climbed the lookout tower where a light breeze ruffled our hair and tempered the hot sun. Though the shade temperature was only in the upper eighties or lower nineties, we seemed to be descending into a furnace in the dunes. Many factors operate here to cause this heat: no cooling breeze, reflection of sunlight from the light sand, convection of absorbed heat in the sand, and heat being generated by the exertion of moving through soft sand. In spite of the heat we followed the track for about a mile amongst a more active avifauna. Striated Pardalotes were seen flying and Yellow-plumed Honeyeaters and Little Thornbills were feeding in the foliage.

It was too hot, so we returned to the car and went for a drive on the alternative route to Wonga Hut. There were many stops for bird watching, and a considerable time was spent watching the antics of some Rainbow Birds. They differed from those which I had seen before, lacking the black bib and having a golden crown instead of the usual green one. A later look in Mr. McEvey's drawer revealed similar birds. They were juveniles.

We saw many kangaroos on this route. It was now midday and most of them were resting in the shade of trees, and were disinclined to move as we drove slowly very close to them.

Reaching Wonga Hut we found that a husband and wife team of naturalists had moved in. They were both science teachers from Madera, California, and were on sabbatical leave to extend their knowledge of this continent. They were at first bitter in their complaints of the wildness of our creatures; White Cockatoos, Emus, and kangaroos; which would not allow a close approach to be made for photographic purposes. It seems that in some U.S.A. national parks the animals are completely tame owing to the density of visitors. In fact, in Yosemite National Park, visitors have to make a booking to be able to enter the park at all. I mentioned that we too, have some places where the

animals pose for photographs, or rush to introduce themselves hoping for a handout, but stressed that Wyperfeld was a primitive park where patient observers can see the flora and fauna as it normally exists. To illustrate the point, we drove to Black Flat, seeing many kangaroos and photographing some. A walk into the dunes disclosed the tracks of many birds and a Jerboa type mammal. A couple of freshwater mussel shells lay exposed on some wind blown sand. An almost permanent Red Wattle-bird introduced himself to the visitors from a tall River Red Gum showing the vividly yellow breast. Striated Pardalotes worked in the same tree. Hearing the "creaks" of galahs and the "craaks" of White Cockatoos, we moved to a vantage point near the Black Flat pool. The sounds grew louder. Three Pink Cockatoos flew into an adjacent tree, and then the sky was filled with grey, pink and yellow-tinged white as the two other species circled, landed, and then flew again in the rosy evening light. In the dusk we drove back to Wonga Hut, passing many more feeding animals and delighted to see more than fifty scatter from the pool at Wonga Hut when they heard us coming.

Just after bedding down that night, a soft plop and a scratching sound alerted us and we captured a small bat whose photograph was taken by my brother. A mopoke called and we returned to bed.

On the Saturday, there was no wind, but it was cool enough for a pullover.

I set off at a slow pace up the Brambrook Track. The Grey Butcher-bird was already up and I watched two delicate Redthroats working along the branches of a half dead Slender Cypress Pine. A Crested Pigeon flew past, followed indirectly by 23 White Cockatoos. In the tea tree, a cheerful call indicated wrens, and four of them appeared, one male and three females. At the same time I noted a family of Thornbills, one of which was being fed. A White-eared Honeyeater called from the tip of a dead Mallee eucalypt while two Ringneck Parrots moved sluggishly nearby. Another Ringneck approached and stopped within range of my binoculars. Unlike the normal birds its wing bar was extremely yellow—more yellow than any in the museum collection which I saw on my return to Melbourne. A scolding noise in a small clearing was caused by three Southern Scrub Robins playing chasey.

By now it was 7.20 a.m., and the pullover had been discarded with the temperature at 72°F.

We had breakfast, packed in the rising heat, and moved out of the park. Between the park and Yaapeet we stopped to examine a cutting which had been glimpsed in the half light on the evening of our arrival. It was pitted with many burrowed nests, and the three White-backed Swallows which were circling the area indicated that a large colony of these birds must use this convenient cutting year after year.

Farther south near Rainbow, we saw many trees which had been uprooted by that sudden storm on last Wednesday, but even the reminder of our narrow escape could not diminish our intentions to return sometime to Wyperfeld National Park.

Notes on the Gnareeb-Gnareeb Tribe of the Western District

by Aldo Massola

Gnareeb-Gnareeb was the name of one of a group of tribes loosely referred to as belonging to the Mara "Nation". Their territory was all the country enclosed within a line running from a point north of Mt. Abrupt to the Hopkins River a little north of present-day Wickliffe, then to Lake Bolac, down Salt Creek to about south of Woorndoo, west to Muston's Creek at about Caramut, and along the creek north to its sources, and across to the starting point at Mt. Abrupt.

These people are sometimes referred to as the Tjapwurong, literally, Soft-lip, in reference to the way they pronounced certain words in their language, but this peculiarity they shared with other tribal groups of the Mara.

Gnareeb-Gnareeb, as far as can now be ascertained, was their distinguishing name, and means They, the Many Men, and probably referred to their being a large, powerful and proud tribe. This is evidenced by the fact that the appearance of Major Mitchell's cavalcade did not instil fear into these people, and four of them boldly marched into his encampment on the evening of 20th September, 1836; only departing after they had been presented with a tomahawk. Later that evening, however, one of the Major's men discovered a native hiding behind a small bush quite close to the encampment, who, in his precipitous flight, left behind a bag of the kind carried by native women. It contained mostly food—three snakes, three native rats, about 2 lb. of small fish like whitebait, crayfish, and a quantity of edible roots. There were also several pieces of ochre for coloring, and two stone axes. This collection, incidentally, sounds more like the contents of a woman's than of a man's bag, so perhaps it was a woman who was disturbed. It does show, however, that food and stone axes were plentiful. The following morning a party of forty aborigines approached the camp in such a determined manner that Major Mitchell had to order his men to charge them "whereupon they all scampered off".

The first white settler in this tribe's territory, appears to have been J. Muston, who as early December, 1839, took up land along the creek now named after him. He was soon followed by other settlers, and the whole of the tribal land was thus taken up: such famous stations as Eilyer; Caramut; Hopkins Hill, later divided into Chatsworth and Berrambool; and Green Hills Creek, later divided into Nareeb-Nareeb and Burie-Burie, thus coming into existence.

The Gnareeb-Gnareeb, in common with other Mara tribes, resisted the coming of the settlers in the usual manner: by spearing sheep, robbing huts, and assaulting lonely shepherds. The white men retaliated with organized hunts, when the natives were indiscriminately shot, such as at the "Battle of Lubra Creek", a slaughter which is said to have occurred a few hundred yards up the creek from the main Penshurst-Caramut Road. The natives were surrounded in the dense scrub, and shot down; but upon examination it was seen that most of the men had apparently escaped, and those killed were the lubras, hence the name of the creek.

However, the plight of these people

Headstone on grave of Barrinbittarney at Narreeb-Nareeb Homestead Cemetery.

(The breast plate worn by Barrinbittarney is now in the Warrnambool Public Library)

Photo: Author

came under the Government's notice: in 1840 John Cox, who had taken up Mt. Rouse, was summarily evicted and the mount and its vicinity proclaimed a Native Protectorate under a Dr. Watton.

The Protectorate was not a signal success, and ended in 1842, since it was found impossible to contain the remnants of the tribes within its confines; but the aborigines were made to realize that it was better to accept the inevitable, and submit to, and work for, the settlers.

Other white men, such as Charles Gray, at about this time befriended the aborigines, and he employed a number of them on his Nareeb-Nareeb station. In his reminiscences as published under the title, "Western Victoria in the Forties", he stated that:

> "One of the most helpful and faithful of the natives was one called Timour, who was head of the tribe. When he died at an advanced age he was buried in the station graveyard at Nareeb-Nareeb. The ceremony was carried out by members of his tribe, I providing a large gum tree from which two pieces of bark were cut. The body was laid between the pieces of bark and secured by thongs of kangaroo sinew".

It sounds strange that he provided "a large gum tree", which, of course, should be regarded as belonging to Timour in any case!

However, a headstone was provided, although this fact is not mentioned in Gray's reminiscences; and on it Timour's real name was engraved, Barrinbittarney, and the date, 1878.

Gray, incidentally, had been adopted into the tribe, he having been "recognized" as her dead husband returned to life, by a dusky belle and her three or four piccaninnies! To them he was Tirrootmerrie, a name by which he came to be called by all "his" aborigines.

Like most settlers, Gray's time was fully occupied with the events of this period, and if he did acquire any knowledge of the natives he did not record it beyond stating that he "knew somewhat of their language". He did not thus make mention of what I suspect was the reason for the importance of the Gnareeb-Gnareeb. As well as fine lands well provided with water and edible roots and game of all kinds, there was, in their territory, a rare commodity. Outcrops of diorite, with which to make stone axes, and outcrops of sandstone, upon which to grind them to a fine edge.

Outcrops of diorite occur elsewhere in Victoria, at Gellibrand, in the Otway Forest; at Ceres and Dog Rocks, near Geelong; at the Howqua River, near Mansfield; on Deep Creek, near Eddington; and on Mount William, near Lancefield. In the Western District there is a small deposit at Jaluka; but most of the material for the local axes must have come from one of the several quarries on this tribe's territory. Some of these deposits

Stone Quarry (see text) on the Hopkins River at Berrambool Station.

Photo: Author

are known to me: one is on Mt. Stavely, on the headwaters of Reedy Creek; another is in the bed of the Hopkins River at the Berrambool Ford Bridge; a third is on the banks of the Hopkins River on Berrambool Station, about a mile downstream from the homestead. This appears to have been the principal quarry of this tribe—an area of about 36 feet in length and about 6 feet in width is covered with chippings and flakes detached from the protruding boulders on the water's edge, possibly by the usual method of lighting a fire on the rock, and throwing cold water upon it when hot. This would cause the rock to "explode", or, at least, to fracture.

Diorite also outcrops on the river bed upstream from Berrambool Homestead, close to a permanent large and deep waterhole in the Hopkins River, from which the Station probably took its name: (Berrambool, should probably be *Burumboluk*, large or deep water); and there is also a deposit on Gray's Creek, a tributary of the Hopkins River. It is at the back of Tope's homestead, but on Chatsworth House land.

The sandstone upon which the axe "blanks" were ground outcrops on the "ridges" at the headwaters of Gray's Creek, which now form part of "Fernlea", but were previously part of Nareeb-Nareeb. These outcrops consist of irregular masses of sandstone protruding a few inches above the surface of the soil. At the time of my visit the ridges were growing wheat, and the outcrops were difficult to locate amongst the thick growth. For this reason there may be more of them than I was able to examine. Those that I saw were in four groups. The first, and most southerly, is quite close to the fence dividing Fernlea and Nareeb-Nareeb. In this group there were about a dozen small boulders, ranging from about 2 ft. 6 ins. by 20 ins. to about 18 ins. by 18 ins. At least seven of these boulders exhibited one or more grooves where axes had been ground.

About 300 feet north of these there is what I may call the central group. It consists of eight boulders, the largest of which measures about 5 ft. 6 ins. by 4 ft., and exhibits at least ten grinding grooves, ranging in size from 6 ins. by 4 ins. to 10 ins. by 8 ins. The other seven boulders in this group range in size from 18 ins. by 12 ins., with one groove, to 3 ft. 9 ins. by 3 ft. 6 ins., with three grooves. The larger grooves appear to have been ground deeper and wider than the others, expressly for the purpose of holding water, no doubt to assist in the grinding process.

About 50 feet east of this central group there is another large, and several small outcrops each showing grinding grooves; and about 400 feet north-east of the central group there are several more. An oven-mound, al-

Sandstone grinding rocks on "Fernlea".

Photo: Author

though ploughed-out, can still be discerned about 450 feet west of the central group.

As already stated, the wheat crop made it difficult to perceive any extraneous feature on these ridges, and no doubt other grinding rocks and ovens exist, but were not seen by me. The importance of these grinding rocks cannot be minimized, since they are the first to be discovered in the Western District, and only the fifth, so far in the whole of Victoria. These and the diorite outcrops would give the Gnareeb-Gnareeb an envied position in relation to the other tribes, since by exporting the stone axes they could obtain in exchange any other commodity they may require.

What this could be is, however, not apparent from what we know of the tribe. Food and water were plentiful throughout the tribal territory, and they owned a frontage on Lake Bolac and down Salt Creek, where, we know, the allied tribes met yearly in the autumn, and erected stone weirs for trapping the large number of eels which at that time of the year found their way to the sea. In the spring the inter-tribal meeting place was Buckley Swamp, known to them as *Murroa,* a little to the east of Mt. Napier where the tribes "netted" large numbers of emus for which this locality was famous; and at other times they wandered about, as the many camps and shield and canoe trees scattered throughout the district testify.

The last corroboree was staged in 1862, about two miles outside Hexham. By the end of the decade only a handful of pure bloods roamed around from station to township, the most notable of these being Sam Robertson and his lubra, Mary; Johnny and Louisa Costello; Jim and Jenny Sutton; Jimmy Ware; Colin Hood; and King Morpha.

The last of the Gnareeb-Gnareeb is reputed to have been Sambo, of Nareeb-Nareeb Station, but the date of his death is not known.

Acknowledgement

It is my pleasant duty to here record my indebtedness to the landowners of the district, especially to Mr. S. Beggs of Nareeb-Nareeb, and Mr. Holyman of Berrambool, for information and hospitality given over the years.

Book Reviews

Birds of Australia

by Stanley Breeden and Peter Slater

Published by Angus and Robertson

11" x 9", 144 pages. 197 half-tone and 26 colour plates; 16 b. & w., and 6 monochrome illustrations. Printed on high quality art paper, with stiff cover and full colour dust jacket. Price $5.50.

With the increasing number of books appearing on the market dealing with some general aspect of Australian natural history, it is almost certain that some will be mere pictorial records of our native fauna and flora, with very little authoritative text on the subject.

These books of course serve a purpose in supplying the needs of transient tourists.

Birds of Australia, however, although containing well over 200 photographs, could never be placed in this category.

In the first 40 odd of its one hundred and forty-four pages, sufficient information is given to give the reader a sound grasp of the five broad groups into which Australian birds may be divided: courtship displays and nesting techniques; the raising of young birds; and feeding habits.

The remainder of the book is devoted to chapters on the birds of rivers and lakes; birds of the night; of the rain forests; of the inland; of eucalypt forests; and of the ocean and shore.

Certainly, a great amount of thought has gone into this book from the co-authors, Stanley Breeden and Peter Slater, both of whom are renowned nature photographers; and in combining their many talents with other top-class photographers and capable publishers, they have produced a work which without doubt is a valuable addition to the nature lover's library, as well as being an excellent text for the advanced junior naturalist.

—G.M.W.

The Wonderful Butterfly

The Magic of Growth in Nature

by Jean Galbraith

Published by Angus and Robertson

10" x 7½", 50 pages. 37 colour and 2 half-tone plates. Printed on high quality art paper, with stiff cover and coloured dust jacket. Price $2.95. (Age group 7-11 years.)

For the young nature lover of State school age, the term "metamorphosis" probably does not appear in the spelling list, and not too many would wish it to. But with Jean Galbraith's book, "The *Wonderful Butterfly*" at their disposal, they would very soon come to understand the meaning of the word, which is perhaps more important than the spelling of it.

Miss Galbraith understands what is required to capture children's interest, and in this book, her clear and simple text will do just that.

Perhaps the title suggests a rather singular and limited content to the

book, but this is certainly not so. The insect world, marsupials and monotremes, birds and amphibians, fish and plants, are all represented by well chosen subjects to emphasize the "magic of growth in nature".

For the most part, the illustrations are clear and self explanatory; although one or two are perhaps a little unfaithfully reproduced in their colour.

However, this is minor criticism of a particularly attractive and well-produced book—a book which any young naturalist (and many older one) would be pleased to receive as a present.—G.M.W.

"Australia's Western Wildflowers"

by M. K. Morcombe

(Lansdowne Press, 1968)

11" x 8½". 112 pages, 130 colour plates, 30 line drawings, several monochromes. Price $5.50.

Western Australia is now fairly well endowed with illustrative guides to its amazing and prodigal flora, but no single volume could hope to portray more than a small fraction of the 7,000 kinds of wildflowers indigenous to this vast State. The most recent, and certainly most spectacular, presentation of Western flowers is Mr. Michael Morcombe's book under the above title. As a very talented nature photographer and Associate of the Royal Photographic Society, he has travelled widely to secure the dazzling and surpassingly beautiful studies now assembled.

There is a selection of a dozen different banksias, as many orchids, six eucalypts and five wattles, and a pleasing representation of grevilleas, feather-flowers, melaleucas, kangaroo-paws, everlastings, etc.; but one misses the Qualup Bell, Pitcher Plant, Southern Cross, Native Pomegranate and a few other favourites. Full-page portraits of Showy Dryandra, Bell-fruited Mallee, Scarlet Banksia, Mondurup Bell and Broad-leaved Isopogon—each against a muted backdrop of the dramatic Stirling Range — call forth special admiration, as do the bird pollinators at work, and the nocturnal flashlight shots of tiny nectar-seeking mammals. Photographs are not all of equal clarity, and some smaller reproductions of dull subjects against blackish backgrounds could have been omitted or replaced. A highly informative, interesting text fills in all blank spaces between plates, and a fascinating chapter is devoted to plant-animal partnerships.

Here is a book that cannot fail to stir up interest in Australian wildflowers; may it also strengthen a resolve to save and protect what still remains of West Australian sandplains and roadside flora while there is time.—J. H. WILLIS.

Readers' Nature Notes and Queries

These columns are available for all members, young and old, to bring before others their own observations in nature. Correspondence may be sent to the Editor, 54 St. James Road, Heidelberg.

This dramatic description of a wasp's busy life is sent from Mr. Fellowes of Charters Towers.

Noticing a huge wasp's frantic search on a bare cement slab for some lost victim, at that moment not in sight, the wasp suddenly disappeared over the cement edge, returning to the top with a paralyzed trap-door spider, which it hastily dumped there.

A moment later the wasp moved quickly to a small soil depression two feet from the cement slab, hesitated a moment, then began vigorously digging—pausing now and again to back out from the growing hole to fling a continuous shower of dirt between its rear legs, the forelegs alone doing the "shovelling".

Another quick rush into the hole—more deep buzzing and digging—then another retreat to fling more dirt further from the hole entrance. This was repeated several times, until a sudden cessation of digging followed, a hasty return to the cement slab occurred.

Once again the spider was missing. A small whirlwind had occurred before the first loss of the spider, and another stiff breeze had this time caused the spider to roll away.

The wasp, of course, was in the hole at the moment of the second movement of the spider, yet only seconds later it was searched for, and reinstated on the cement.

Meanwhile, the wasp's unusual colouring had impressed me; being almost entirely black, excepting for a few white rings encircling the abdomen, and a few white head markings. The eyes appeared to be jet black.

The digging began again; then suddenly I noticed something I had missed previously.

Approximately six inches above the hard-working wasp, and hovering on barely perceptible wings, was a tiny fly-like creature, also black and white in its colouring, but with relatively large head and tapering abdomen.

As the wasp backed out of the hole it paused, turned quickly to right and left, and repeated this procedure several times. The tiny "hoverer" did likewise, always facing in the same direction as the wasp.

At this stage I was called away, and twenty minutes elapsed before a hasty return was possible.

What confronted me at this stage was a flushly filled hole, with no indication of its existence but for the fact that I had laid a straw some distance from it, pointing to its location.

No "earth-mover" nor "stand-over" participant was to be seen, but I assumed the probable egg-laying or the interment, whichever was the case, was satisfactory to all concerned.

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Whale Strandings at Port Fairy, Victoria

by K. G. Simpson*

During late 1959, Miss Gracie Bowker, a primary school teacher and prominent local ornithologist of Port Fairy, Western Victoria, gave me three photographs showing a Sperm Whale (*Physeter catodon*), dead on a beach in the district.

The recently published summary of whales and dolphins recorded for Victoria (Wakefield, 1967) did not mention this specimen, so I wrote to Miss Bowker for the details. These she promptly supplied, together with information concerning several other whale strandings near Port Fairy. She also very kindly gave me permission to present in this article the notes from her log books. The accompanying photographs are reproduced from her colour transparencies. Duplicates of the slides have been lodged with the Mammal Survey Group, National Museum of Victoria, and Fisheries and Wildlife Department.

Sperm Whale, *Physeter catodon*

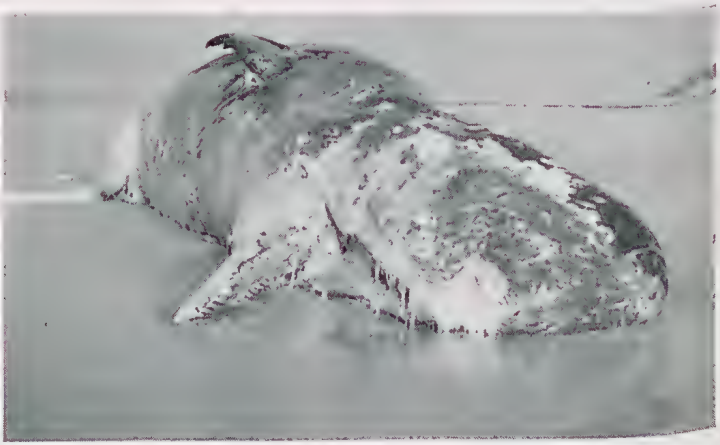
1. "On March 21, 1959, a female Sperm Whale was washed on to the beach at The Cutting, Tower Hill Beach, nine miles east of Port Fairy. Mr. Brian Maloney had watched this sick whale wallowing near the shore for three days prior to its death. It was thirty-eight feet long. Eventually the whale disintegrated and the bones were scattered on the bar. Two of the vertebral sections now make fine seats on my garden lawn."

A large wound is visible as a white patch, immediately anterior to the centre of the upper lip, and it was possibly caused by a shark, during or after the death of the whale.

Wakefield (*op. cit.*) mentions without being more specific, one or more whales sighted by local residents off the Port Fairy coast during 1966 and 1967. The following record by Miss Bowker may be one of them:

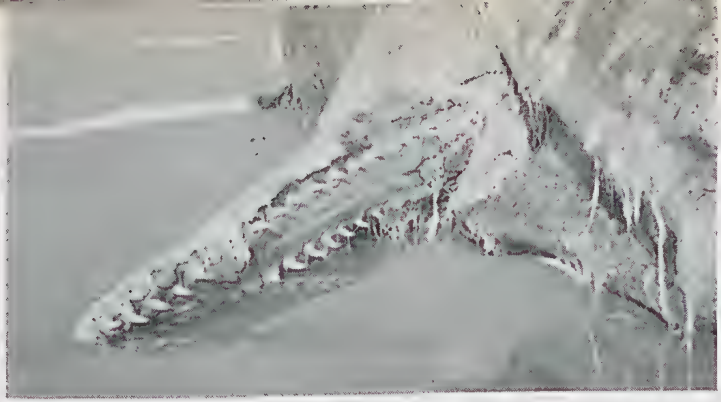
2. "During August, 1966, a very big whale, identified by fishermen as a Sperm Whale, came into the bay at the East Beach. A calf was seen a day or so later. The fishermen said that whales have calved in that area before. With binoculars, from the shore, I guessed the calf to be about fifteen feet long, while the cow seemed to

* 27 Kingswood Drive, Dingley, Victoria 3172, for the Mammal Survey Group, F.N.C.V., c/o The Hon. Secretary, 40 Howard Street, Reservoir, Victoria 3073.



The beach-washed Sperm Whale at The Cutting, Tower Hill Beach, via Port Fairy, Victoria, March, 1959. (Note probable shark bite)

photo: Miss G. Bowker



Detail of the mouth to show toothed lower jaw.

photo: Miss G. Bowker

be three times that length. The whale stayed seven days before disappearing to sea with the calf."

Pilot Whale, *Globiocephala melaena*

Strandings of this species are fairly commonly reported from Victoria. Miss Bowker records two occurrences, each of a single whale.

1. "On December 2, 1953, I found a dead whale washed into a small rocky cove at Little River Beach, where the small creek enters the sea some four miles west of Port Fairy. Two Giant Petrels (*Macronectes* sp., Procellariformes) were feeding on the whale.
"On December 5, accompanied by Miss M. Brady, I again visited the whale. Four Giant Petrels were now feeding. We were able to identify it as a Pilot (Blackfish) Whale. It was twenty five feet long.
"By December 9, it had been washed one hundred yards up the Little River and covered with a mound of sand forming a domed bar which completely cut the creek off from the sea. Not until the following year did this hump flatten and allow water to flow into the sea again. The beach was then found covered with bones."

2. "A dead whale was found on the rocks at the South Beach, Port Fairy, on July 16, 1955. It too was a Pilot Whale, twenty feet in length."

Common Dolphin, *Delphinus delphis*

"Thirty four Dolphins were chasing a school of fish at the East Beach, Port Fairy, on May 14, 1959. The tide was low and seventeen of them became stranded on the beach. The local fishermen collected and killed them, cut them up, and stored them in the freezer of the Fisherman's Co-operative for use as bait."

An unidentified whale

"A very big, thick-bodied whale was washed on the bar at The Cutting, Tower Hill Beach, nine miles east of Port Fairy, on November 27, 1961. I found this whale when it was quite fresh and was amazed to find it headless. The head had been cut or sheared off perpendicularly, as correctly as if guillotined, apparently by some sea creature. The remaining body was twenty feet long and it towered two feet over my head, which is five feet from the ground. The whale was never identified."

From the description of the injury, it is possible that the 'sea creature' was constructed of steel, with a sharp bow, and travelling at a fair speed when it collided with the whale. The clean vertical cut, the great size of the wound and the animal's fresh state, could be consistent with a whale killed by collision in the shipping lane some miles out to sea in Bass Strait, and washed ashore fairly soon afterwards.

Acknowledgement

Mr. John Seebeck, Fisheries and Wildlife Department, Melbourne, kindly read and commented on the manuscript.

REFERENCE

Wakefield, N. A. 1967: Whales and Dolphins recorded for Victoria. *Vict. Nat.* **84**: 273-281.

Abnormality in *Leptoceras fimbriatum* (Lindl.)

by David L. Jones

Photographs by R. G. Richardson

Abnormal specimens of *Leptoceras fimbriatum* Lindl were collected by the author on Mount Ingoldsby at Anglesea, on 23 April, 1967. The plants were located amongst normal flowers in a colony numbering more than 200 individuals, In all, 28 plants were flowering; 21 of which exhibited double heads—a total of 49 flowers. This is an unsually high number for this orchid, as generally only odd plants in the colonies flower. However, the increase was probably due to a carryover effect of the bushfire which swept the area in 1965. The response of this orchid to such a stimulus is amazing.

While studying the flowers, it was noticed that one with a single head, had multiple labellum development. Closer observation showed that in all three segments were present. A large segment at the bottom of the "tier" suggested a normal labellum, except for a niche missing from one corner. In this corner just above the niche was another much smaller segment; almost a perfect replica of a labellum in miniature. Comparison suggested that the smaller segment fitted into the niche on the larger labellum, but it was obvious that the two segments had developed seperately. Close in at the base of the column a third, very tiny segment, was visible. Obviously this was of labellum tissue because of the prominent markings, and the type of tissue of this organ.

Double-flowered Leptoceras; normal flower (upper), abnormal flower lower right. The 3 labella are easily visible.

After this find, a closer scrutiny of other plants in the colony revealed another flower aberrant in a similar way. The plant in question had two flowers, one of which was normal while the other had three labellum segments as before. In this case, however, the hand lens revealed that three perfectly formed labella were present, with no suggestion of distortion. The bottom central segment was the largest, being slightly smaller than normal size. Closer to the column on the right was another one, slightly smaller again, and on its left was the third and smallest of all. This latter one was the highest, and overlapped the others. Overall, the space between the column and normal labellum was very crowded. I imagine things would be very cramped for any pollinating insect; although some plants in the column had swollen ovaries, this feature was not conspicuous in the abnormal flowers.

To the best of the author's knowledge, this is the first reporting of teratalogical formation in the orchid *Leptoceras*.

Aberrant orchids have been reported in many genera by various authors, and naturally enough, not all variations are similar. A general review of the various tetralogical forms collected may not go amiss.

Aberrance of colour seems to be fairly common, especially in polymorphic genera such as *Caladenia* and *Glossodia*. Albinos are common enough in both plant and animal kingdoms, but in Victorian terrestial orchids the most noteworthy have been *Calochilus robertsonii, Pterostylis nutans*[2], *Pterostylis curta, Pterostylis concinna, Diuris pedunculata,* and *Diuris maculata*[3]. As well virescence (reversion to a green sepaloid form) has been recorded in *Thelymitra ixioides*[3]. A most interesting coloured orchid was a canary yellow form of *Diuris punctata* collected on the New England Tableland in N.S.W.[4] This must have been a gem indeed. The late W. H. Nicholls has also recorded a cream form of this species[5]. As in other families of plants, variegated foliage is occasionally found in orchids. The author has collected variegated rosettes of *Pterostylis nana* at Rushworth, and as well, a variegated *Pterostylis nutans* is known[6]. Because of vegetative propagation in these species, a clone of plants may build up from the one mutation. Orchid foliage is also subject to much variation in shape[11].

Doubling up of some floral organ or the inclusion of a sterile appendage seems to be another teratalogical feature often found in certain terrestrial species. Perhaps the most remarkable find of this kind was a *Caladenia dilatata* with two columns, one of which contained the stigma, while the other held the anthers. As if this was not sufficient, this amazing flower also exhibited two lateral petals which were very good replicas of the labellum[7]. A *Caladenia patersonii* from the Grampians with two rows of perfect calli along one lateral petal has also been reported[12]. *Glossodia major* seems to have a double labellum fairly frequently[8,3]. As well, *Prasphyllum odoratum*[9,3] and *Prasophyllum elatum*[3] have been found with two conjoined flowers arising from the one bract, although other flowers on the spike were normal. Double sepal development has also been recorded in *Prasophyllum odoratum*[9]. A *Chiloglottis reflexa* with conjoined lateral sepals and a curious cruciform tipped labellum has also been reported from Creswick[12].

Both abnormal specimens with single-flowered one on right. Note the crowded flowers on specimen at left.

The inclusion of a sterile appendage at the base of the column seems to be a fairly regular appearance in two species of *Thelymitra*, viz. *Thelymitra fusco lutea*[8] *and Thelymitra circumspecta*[10]. A possible explanation is that the appendage represents the reversion to the anthers, as found in the orchid's ancestral past. It is interesting to note that in the *Thelymitra fusco lutea* described by W. L. Williams[9], all the flowers on the spike were identical. In the two-flowered *Leptoceras* described, one flower, however, was quite normal.

Double heads also occur in plants which are normally single flowered. Thus two-flowered *Pterostylis curta, P. concinna, P. pedunculata, P. obtusa* and *P. revoluta* occasionally occur. The author has also collected specimens of two species which appeared as if nature had grafted two mature plants together. The first was a *pterostylis barbata* from Warrandyte; which had two rosettes, two stems, and a complete duplicate of floral organs all joined to give an odd looking plant. The second was a *Caladenia carnea* from The Basin in the Dandenong Ranges. This plant had two leaves in opposite directions, two united stems, and a duplicate of floral organs at the top, reminiscent of a worn paintbrush. In both specimens the flowers were joined with the labella together. This formation has also been recorded in *Pterostylis pedunculata* from Portland[12].

A further curious development is the occurrence of petaloid forms in *Diuris* species such as *Diuris sulphurea* and *Diuris pedunculata*[5]. This phenomenon occurs when the lateral sepals develop shapes similar to the lateral petals. In extreme cases the result is a flower resembling in shape, the garden pansy. Nicholls in his article[5] maintains that *Diuris dendroboides* Fitz G. is nothing more than a petaloid form of *Diuris punctata.* (Rupp in the same article, however, defends FitzGerald's judgment.) Here in Victoria it seems highly probable that two very rare greenhoods were nothing more than aberrant petaloid forms of close common species. I refer to *Pterostylis celans* M. M. R. Rupp, apparently a development of *Pterostylis nana* in the Portland area, and *Pterostylis crypta* W. H. Nicholls, which appears to be an unusual form *Pterostylis obtusa.* It is interesting to note that two specimens of *Caladenia menziesii* with unusual petaloid labella containing undulate incurved margins and papillate glands, have been collected in the Portland area[12]. This and the *Caladenia dilatata* reported earlier[7], are the only members of this polymorphic genus to have been reported with such developments.

From such a short review as this, it is apparent that the Orchidaceae as it is represented by terrestrials in Victoria, is subject to much variation embracing many genera and species. There is probably no single reason for this, as genetic variation can occur in any race of plants; but what seems an abnormally high number for this small group of plants may be an indicator of rapid evolutionary processes still occurring within them.

References

1 W. L. Williams—An Albino Orchid (*Calochilus robertsonii*). *Vic. Nat.* **69**; 10—Feb. 1953.

2 Albino Greenhood. *Wild Life*— Nov. 1949.

3 Author—various collections.

4 H. M. R. Rupp. Notes on some Unusual Colourings in Orchid flowers, *Vict. Nat.* **53**; 8—Dec. 1936.

5 W. H. Nicholls — two Variable Orchids, *Vict. Nat.* **46**; 9—Jan. 1930.

6 R. McIlwain—personal communication.

7 E. E. Pescott—A remarkable flower of *Caladenia dilatata, Vict. Nat.* **55**; 8—Dec. 1938.

8 W. L. Williams—Abnormality in *Thelymitra funco-lutea, Vict. Nat.* **61**; Nov. 1944; *Vict. Nat.* **68**; 1—May 1951.

9 E. E. Pescott—Double labellum in *Prasophyllum, Vict. Nat.* **56**; 10—Feb. 1940.

10 J. A. P. Blackmore—An orchid in the course of evolution? *The Orchadian* **2**; c—June 1966.

11 W. H. Nicholls—Greenhood Orchids, *Vict. Nat.* **46**—June 1928.

12 W. H. Nicholls—Notes on Quaint Orchid Forms, *Vict. Nat.* **61**; 12—April 1945.

13 W. H. Nicholls—*Pterostylis crypta, Vict. Nat.* **61**; 12—April 1945.

14 H. M. R. Rupp—*Pterostylis celans, Vict. Nat.* **61.**

Layman's Impressions of FNCV Excursion to Wangaratta Dec 66 - Jan 67

Monday 26.12.1966

By the time our company had spread out for lunch among the Woolly tea tree (*Leptospermum lanigerum*) along the banks of the river at Taggerty on the Maroondah Highway, our Boxing Day lethargy was fading, and discussions concerning the Puff-balls at our feet, and the Silver gum (*Eucalyptus crenulata*) at Buxton, gradually out-weighed stories of Christmas Day activities; and the Field Naturalists slowly resumed their characteristic out of doors interests.

The short journey to Alexandra along the Acheron Cutting overlooking the Goulburn, gave clear evidence of the violence of a recent storm, the number of fallen trees arousing much comment. In Alexandra itself (the old-time gold-mining centre once known as Redgate) our driver, Bill, having a personal knowledge of the district, talked to us of the early coaching day relics still kept behind the modern facade of McKenzie's Garage in the centre of the town, and of the Powder Magazine still to be found in a side street.

Further on, along the road to Yarck, the childhood home of Dame Pattie Menzies (Leckie) was drawn to our attention. In glorious weather we proceeded through lightly wooded grassy country to Merton, then over the winding road to Big Hill and Seven Creeks, reaching the Hume Highway at Euroa, with its conspicuous clumps of Tree-of-heaven in the gardens. At Wangaratta, reached in easy time for dinner, a splendid sunset formed a colourful background for a graceful Spotted gum (the roosting place of a large number of magpies) at the motel entrance, with lorikeets chattering vigorously in the adjacent trees.

Tuesday 27.12.1966—Buffalo [1]

On this morning, a prompt start was made along the valley of the Ovens River, where to the uninformed eye, the fields of hops and tobacco gave no signs of recent floodings. Turning off at Porepunkah, through the purple-podded Silver wattles of the river valley, we enjoyed the steady climb to the Buffalo Chalet area, noting the ruby-red markings on the trunks of the Candle-barks, with the Snow gums emphasising the higher altitudes. Crescent and yellow-faced honey-eaters, pardalotes and the elusive brown thornbills tantalised bird-observers into making tentative identifications, whilst the magnificent rock formations of near and distant mountain masses delighted the geologists. During lunch on the butter-cup-and-daisy studded grassy slopes facing the ski-runs, with music provided by a not-far-distant lyre-bird, few naturalists could be found to work up any enthusiasm for the study of the insects which were crawling, flying, nipping and stinging many of us, and not for the last time on this trip.

An enjoyable scramble up to the Corrals gave opportunity for all to follow their chosen pursuits, with the eagle-eyed, knowledgeable and agile specialists finding their pleasures at least equalled by that of the less expert or fortunate members, who sampled and savoured with enthusiasm the varied beauties and interests offering, all the while consciously or unconsciously storing away vivid impressions and practical information.

1 See Botanical list No: 1.

Wednesday 28.12.1966—Hume Reservoir [2]

Wednesday was the day scheduled for the trip to the Hume Reservoir, and we set off through Beechworth, where our leader for the day, Mrs. F. Gladstone, joined us. Passing through fairly open country, the kangaroo-grass was a feature of the road-side; whilst the deep shade of the introduced false acacia marked the position of many farm-houses. Welcome Ibis flocks were busily working their way through the insect population; Eastern Rosellas and Superb Blue Wrens contributed their vivid colours to the scene; whilst an occasional harsh call drew attention to Galah and Plover.

A pause was made at the Hume Dam, where silky oak and spotted gum were notable, with skeleton weed and Salvation Jane edging the pathways, and where the shadowed waters below the spillway gave hospitality to herons, egrets and cormorants. Passing the Bethanga Bridge we followed first the Murray River Arm of the Reservoir, passing through Old Tallangatta, with its trees persisting in the encircling water, and where a sacred kingfisher greeted us from a telephone wire, then across the hills to Bullioh and down the Mitta River Arm, where an unbelievable number of cormorants put on a wonderful display for us, deserting their roosting places on dead trees, first in masses, then in twos and three, and finally all settling in safety in the distance.

Some little time was then spent at the Yackandandah River, where enthusiasts sought gold in the metamorphosed schist of the river bed, and others sought shade under the Ovens acacias, the feathery Silver wattles, and the chubby-leaved red box trees. The return journey was completed after a welcome pause at Yackandandah, very quiet on his hot afternoon.[2]

2 See Botanical List No. 2.

Thursday 29.12.1966—Bogong High Plains [3]

This journey was anticipated by all of us with much pleasure, the Rocky River Dam above Fall's Creek being our objective. Proceeding through Bright, with its walnut trees and poplars looking very pretty and holiday-makers enjoying the sunshine, we crossed through the thickly timbered country to the Tawonga Gap, where the brilliant gold of a Senecio brightened the foreground, then down to the Kiewa Valley, passing Cranky Charlie, Mt. Beauty, and on up to peaceful Clover Flat, Bogong, and on to Fall's Creek, noting the local Bogong Gum on the way, and reaching our destination in time for lunch. Snow grasses, richea, violets, daisies, swamp isotome and other treasures abounded at our stopping place beside the Dam.

Shortly after lunch a brief but severe rain storm (the only one of our whole eight days) demonstrated vividly the origin of the many little rivulets coming racing through and over the rocky outcrops of both the Rocky Valley and the adjoining Pretty Valley. On the downward journey past the ski-lodges and runs, we paused at McKay's Portals, where the planting of *Pinus radiata* aroused comment, and where a brief walk gave us the opportunity to study the long-podded hickory wattles, the sturdy columns of stackhousia, the clumps of flax lily, the clematis, various Prostantheras, the veronicas and trigger plants, all of which were growing profusely. Continuing down along the river we passed the Tawonga Gap turn-off, and returned through the foot-hills of the Kiewa Valley to Myrtleford, and so back to Wangaratta in the early evening.

3 See Botanical List No. 3.

Friday 30.12.1966—Beechworth

The "rock-hounds" particularly enjoyed this day spent along the Woolshed Creek area at Beechworth, returning with specimens many and various, but uniformly treasured by their finders whether identified or not. Some were large, some very small, many very heavy, but all were to receive further attention during later quiet suburban evenings. Tales of turquoise, jasper, garnet and gold encouraged their labours.

On returning to Wangaratta some members searched successfully for the dollar bird, which had been reported as frequenting the camping area on the banks of the river. Here river red gums contrasted pleasantly with the shady catalpas which were planted in the area.

Saturday 31.12.1966—Warby Ranges[4]

Miss D. Nason and Miss N. Rossiter kindly gave us of their time on Saturday, when a most enjoyable day was spent on the Warby Ranges property, with our hostesses identifying birds, rocks, and plants most patiently and competently. The lovely old garden tempted us to linger over lunch, watching the butterflies around the Buddleis, and the family of spinebills and other honeyeaters enjoying the sweet-flowered shrubs. The lemon-scented gum yielded its characteristic perfume from the crushed leaves, and many sturdy trees gave over-all shelter.

Away from the house, swamp isotome and fairies' aprons were shown to us, hidden away on the edge of the swamp. The forest red gum, the red, and the long-leaf box were identified, whilst bird watchers were further rewarded with glimpses of red-backed parrots, the little friar bird, and a close and sustained view of the beautiful diamond fire-tail finch, whilst the domestic activities of a pair of rufous whistlers were delightfully displayed.

The day included a swim in the dam (curtailed by a sharp nip or two from some aggressive creature hidden there) the tempting of an inquisitive pony with non-existent delicacies, a walk through the Native Plants Reservation, and the inspecting and prospecting of the disused quarry from which came the granite for the lovely Wangaratta Cathedral.

That evening, New Year's Eve, the members of the Wangaratta Gem Stone Society kindly permitted us to use their Club Rooms, where Mr. Frank Robbins showed very appreciative members some of his slides of the F.N.C.V. excursion to Heron Island. These were run through very expeditiously, with Mr. Robbins' concise commentary being attentively followed by his audience.

Later, the equipment and collections of the Society were viewed whilst members explained their intricacies.

Back at the motel, the New Year came in almost un-noticed by most of our party, tired after a full and satisfying day.

Sunday 1.1.1967—Beechworth

On Sunday, our first stop on the way to Beechworth was at the home of Mr. Bennett, a member of the Wangaratta Gem Stone Society. His outstandingly interesting collection, labelled and displayed to facilitate our handling, was studied with much appreciation.

At Beechworth, we lunched beside the restored Powder Magazine, and then spent half-an-hour at the Museum, which gives such a vivid panorama of the history of the area. Moving on to Black Sands Creek some few miles out, members spent their last afternoon searching according to individual inclination. The return journey was made through Chiltern, and

4 See Botanical List No. 4.

by common consent we ignored the wayside notice "Koalas", but instinctively paused at the exotic sight of peacocks on a farm-house fence. Chiltern itself was quiet, the historic grape vine at the Hotel of that name was admired, and a thought or two was given to the past glories of the old town and its famous one-time inhabitant, the young Henry Handel Richardson.

Monday 2.1.1967—Tolmie Ranges[5]

Melbourne, regrettably to be our destination on Monday, was reached by way of Whitfield, noted for its rumours of gem-stone riches and for tales of Ned Kelly, through the Tolmies where beautiful drifts of rock isotome and more rarely of blue pincushions caught the eye. A pause at the historically romantic Power's Look-out gave opportunity to view mountain ranges and the quiet valley below. Bush-ranging days seemed so long ago.

Our journey was completed by coming through Mansfield, Yea, and Yarra Glen to Lilydale, and so on through the traffic and hustle of the Maroondah Highway again for the last short miles.

It was a well-contented busload of Field Naturalists who sincerely thanked Miss Marie Allender for making all the preliminary arrangements and the day-to-day planning for the Excursion. We all joined with Mr. T. Sault in his expression of thanks to our friend and driver Bill, for taking us so comfortably and safely on one more successful Christmas Excursion.

The appended botanical lists were compiled by Miss L. White, to whom we offer our thanks.

5 See Botanical list No. 5.

Botanical List No. 1—

Messmate, *Eucalyptus obliqua*
Narrow leaf peppermint, *Eucalyptus radiata*
Candle bark, *Eucalyptus rubida*
Eucalyptus dalrympleana
Eucalyptus mitchelliana
Snow gum, *Eucalyptus pauciflora*
Hickory wattle, *Acacia falciformis*
Alpine wattle, *Acacia alpina*
Silver wattle, *Acacia dealbata*
Blackwood, *Acacia melanoxylon*
Acacia phlebophylla
Christmas bush, *Prostanthera lasianthos*
Round leaf mint bush, *Prostanthera rotundifolia*
Alpine mint bush, *Prostanthera cuneata*
Monkey mint bush, *Prostanthera walteri*
Mountain shaggy pea, *Oxylobium alpestre*
Handsome flat pea, *Platylobium formosum*
Pale Wedge-pea, *Gompholobium huegelii*
Hop Bitter-pea, *Daviesia latifolia*
Gorse Bitter-pea, *Daviesia ulicina*
Waxberry, *Gaultheria lispida*
Box Micrantheum, *Micrantheum hexandrum*
Alpine Boronia, *Boronia algida*
Royal Grevillea, *Grevillea victoriae*
Coarse Daisy, *Brachycome aculeata*
Field Daisy, *Brachycome decipiens*
White Everlasting, *Helichrysum* sp.
Golden Everlasting, *Helichrysum bracteatum*
Cascade Everlasting, *Helichrysum thyrsoideum*
Billy buttons, *Craspedia uniflora*
Flax-lily, *Dianella tasmanica*
Alpine Kunzea, *Kunzea muelleri*
Alpine Westringia, *Westringia sentifolia*
Ivy-leaf Goodenia, *Goodenia hederaceae*

Purple Violet, *Viola betonicifolia*
Candles, *Stackhousia monogyna*
Astelia, *Astelia alpina*
Trigger-plant, *Stylidium graminifolium*
Alpine Bottlebrush, *Callistemon sieberi*
Mountain Aciphyl, *Aciphylla simplicifolia*
Derwent Speedwell, *Veronica derwentia*
Mountain Caladenia, *Caladenia lyallii*
Royal Bluebell, *Wahlenbergia gloriosa*
Yellow Marsh-flower, *Villarsia exaltata*
Coral Fern, *Gleichenia;* sp.

Botanical List No. 2—

Tall Lobelia, *Lobelia gibbosa*
Blue Bells, *Wahlenbergia consimilis*
Autumn Lily, *Tricoryne elatior*
Hyachinth Orchid, *Dipodium punctatum*
Onion Orchid, *Microtis unifolia*
Austral Lady's Tresses, *Spiranthes sinensis*
Dogwood, *Cassinia aculeata*
Centaury, *Centaurium pulchellum*
Yellow Centaury, *Sebaea ovata*
Flax, *Linum marginale*
Wild Geranium, *Pelargonium australe*
Hop bush, *Dodonea attenuata*
Swamp Bottlebrush, *Callistemon paludosus*
Varnish Wattle, *Acacia verniciflua*
Box-leaf Wattle, *Acacia buxifolia*
Ovens Wattle, *Acacia pravissima*
Pale Vanilla Lily, *Arthropodium milleflorum*
Smooth Flax Lily, *Dianella laevis*
Blue Pinchushion, *Brunonia australis*
Lomatia fraseri
Common Appleberry, *Billardiera scandens*
White Cypress-pine, *Callitris columellaris*
Black Cypress-pine, *Callitris endlicheri*
Rock Isotome, *Isotome axillaris*
Silver Top, *Eucalyptus sieberiana*
Forest Red Gum, *Eucalyptus tereticornis*
Yellow Box, *Eucalyptus melliodora*
Swamp Gum, *Eucalyptus ovata*
Red Box, *Eucalyptus polyanthemos*
Blue Gum, *Eucalyptus globulus* var. *bicostata*
Red Stringy Bark, *Eucalyptus macrorrhyncha*
Maiden Hair Fern, *Adiantum aethiopicum*

Botanical List No. 3—

(Plants not included in the Buffalo List)
Bogong Gum, *Eucalyptus chapmanii*
Woolly-butt, *Eucalyptus delegatensis*
Alpine Orites, *Orites lancifolia*
Richea, *Richea continentis*
Mountain Pepper, *Drimys lanceolata*
Downy Star-bush, *Pleurandropsis phebalioides*
Mountain phebalium, *Phebalium phylicifolium*
Coral Heath, *Epacris microphylla*
Swamp Heath, *Epacris paludosa*
Star-hair, *Astrotricha ledifolia*
Long-leaf Hovea, *Hovea longifolia*
Alpine Grevillea, *Grevillea australia*
Tall Rice-flower, *Pimelea ligustrina*
Ovens Everlasting, *Helichrysum stirlingii*
Silver Daisy, *Celmisia longifolia*
Bogong Daisy, *Celmisia circifolia*
Daisy Bush, *Olearia phlogopappa* var. *subrepanda*
Alpine Everlasting, *Helichrysum hookeri*
Eyebright, *Euphrasia* sp.

Long-leaf Waxflower, *Eriostemon myoporoides*
White Purslane, *Claytonia australasica*
Silver Edelweiss, *Ewartia catipes*
Alpine Stackhousia, *Stackhousia pulvinaris*
Alpine Rice-flower *Pimelea alpina*

Botanical List No. 4—

Rock Fern, *Cheilanthes tenuifolia*
Necklace Fern, *Asplenium flabellifolium*
Water Fern, *Blechnum* sp.
Harsh Ground Fern, *Hypolepis muelleri*
Prickly Starwort, *Stellaria pungens*
Purple Coral-pea, *Hardenbergia violacea*
Bugle, *Ajuga australis*
Swamp Isotome, *Isotoma fluviatilis*
Hop Bush, *Goodenia ovata*
Bladderwort, *Utricularia dichotoma*
Common Everlasting, *Helichrysum apiculatum*
Chocolate Lily, *Dichopogon strictus*
Fringe Lily, *Thysanotus tuberosus*
Blue-grass Lily, *Caesia vittata*
Nodding Blue-lily, *Stypandra glauca*
Flax Lily, *Dianella revoluta*
Buttercup, *Ranunculus lappaceus*
Sundew, *Drosera auriculata*
Spreading Wattle, *Acacia diffusa*
Lightwood, *Acacia implexa*
Golden Wattle, *Acacia pycnantha*
Red-stem Acacia, *Acacia rubida*
White Box, *Eucalyptus albens*
But but, *Eucalyptus bridgesiana*
Red Gum, *Eucalyptus camaldulensis*
Mountain Grey Gum, *Eucalyptus goniocalyx*
Grey Box, *Eucalyptus microcarpa*
Iron Bark, *Eucalyptus sideroxylon*
Sheoke, *Casuarina stricta*
Cherry Ballart, *Exocarpus cupressiformis*
Mountain Grevillea, *Grevillea alpina*
Sweet Bursaria, *Bursaria spinosa*
Native Indigo, *Indigofera australis*
Correa, *Correa reflexa*
Daphne Heath, *Brachyloma daphnoides*
Dogwood, *Cassinia longifolia*
Grass Tree, *Xanthorrhoea australis*
Rice Flower, *Pimelea linifolia*
Twining Glycine, *Glycine clandestina*
Common Hovea, *Hovea heterophylla*
Manuka Tea Tree, *Leptospermum juniperinum*

Botanical List No. 5—

(Additional to many of the foregoing)
Burgan, *Leptospermum ericoides*
Fringe Myrtle, *Calytrix tetragona*
Guinea Flower, *Hibbertia sericea*
Hop Bush, *Dodonea cuneata*
Pea Bush, *Pultenaea cunninghamii*

History of Blackberry spread in Australia

Mr. R. L. Amor, of the Botany Department, Monash University, Clayton, Victoria, would welcome any information on the origin of blackberry in any particular area, so that the history of the spread of this alien plant can be documented.

Field Naturalists Club of Victoria

General Meeting—14 October, 1968

About two hundred members and friends attended the meeting. The President, Mr. E. R. Allan, was chairman. He announced that an extraordinary meeting would be held before the November meeting to approve the application of the North-east Victorian Field Naturalist Club with the F.N.C.V.

Five new members whose names appear in the October *Naturalist* were elected.

The Speaker for the evening was Mr. A. J. Swaby who gave a stimulating illustrated talk on "Look into these Flowers". He stressed that the average gardener doesn't look into the flowers and remember their purpose, and the adaptations for this purpose.

He showed beautiful colour slides of Geranium and Pelargonium shedding seed, the former suddenly curling their fruit segments upwards, casting seed out, and the latter curling around like a corkscrew, pushing the seeds out. Most garden specimens, however, don't form seeds.

The regular Geranium corolla contrasted with the Pelargonium irregular one with two upper back petals and three lower ones. Guide lines point towards the nectary in the tube.

The hairs on the Iceland poppy stem and drooped bud were adaptations to Arctic conditions where they had to contend with snow. In the open poppy flower bees became covered with the plentiful pollen which they stroked on to special parts of legs. The position of the stigmas allowed pollen to be deposited on them as the insect crawled in the flower.

Special leaves around the flowers of dusty miller, e.g. *Spyridium coactifolium*, helped the attraction of the corolla.

A Nicotiana flower, dull in the daytime, comes out after the sun has gone off, the flower straightening and perfuming the garden. Hawk moths hover and uncoil their long tongue, reaching down the long tube of the flower.

Crinum pedunculatum also has a long tube with nectar. *Crinum flaccidum* and Freezia show a landing spot where insects can land, and the stamens and stigma reach the back of the insect.

The Nasturtium has road signs, a landing ground for insects, a barricade of spikes, stamens opening a few at a time, depositing pollen under the insect as it passes across to the spur nectary, the stigma at first bent over forwards, later projecting, collecting pollen from an insect.

The Chocolate lily has a tip on each sepal keeping the flower locked shut until the atmosphere is dry. In a moist glasshouse one grower could not get lilies to open.

The purple ring on both kinds of Early Nancy flowers (noticed by Major Mitchell) provides a landing spot for insects, and as stamens are just over them, pollen is deposited on the insect, while on the other female flower the three long stigma points are exactly over the ring, also providing for pollination from the insect. In Arums, the yellow tongue has dozens of pollen flowers above, and a number of seed-bearing flowers below. The Noon flower has numerous modified stamens appearing as the attractive part. A few have anthers.

Lasiopetalum sepals are the attractive parts, while the minute, unnoticed petals are right at the base between two sepals. In Everlastings, the showy parts are the bracts around the head of florets. The Blue Devil, looking like a thistle, is actually a member of the carrot family, Apiaceae (formerly Umbelliferae). The spike of Xanthorrhoea has showy stamens and pistils, one section of flowers with masses of stamens, which soon fall, and other older flowers showing many stigmas leading to separate ovaries.

In Hibiscus a bunch of stamens on a tube covers the stigmas, and when stamens are finished with, out come the stigmas. This prevents self-pollination. Alyogyne flowers have a large number of stamens below a single stigma.

Pittosporum bicolour capsules open, showing sticky seeds which stick to birds. Clover flowers showed the difference between the first new flowers and older pollinated flowers which dropped back. Grevilleas and Waratah illustrated four stamens attached to the four perianth parts.

The duck orchid labellum bends forward and shuts an insect in for pollination; while in sage flowers the insect

touches a hinged appendage of the anther which levers the anther, depositing pollen on top of the insect. Later the stigma bends forward, getting pollen from another insect.

In the tall greenhood the labellum shuts the insect in and after awhile lets the insect out. The running postman shows a yellow spot where the insect looks for nectar on the standard to which the two wings of the corolla are locked, until the insect lands on the flower.

In Podalyria there is wet pollen; while on Broom a powdery cloud of pollen shoots up when the wings of the flower are unlocked from the keel when the insect lands. The Swan River Pea showed an enormous red keel, and an almost colourless small standard—Brachysema meaning a short standard Buttercup petals show a swelling at the base of each, where nectar is produced; while in Hellebore the petals are little cups full of nectar.

The trigger plant has a movable column with a brush of stamens around the stigma; while the little spur trigger plant has a column in the centre and it shows a red colour on the hill and white on the lower slopes.

Stamens come first in the blue bell, and after they are finished, up comes the stigma to receive pollen.

In *Isotoma axillaris*, stamens form a closed tube, and the stigma comes up in the middle and pushes the pollen ahead. *Isotoma fluviatilis* has a dark, deep blue ring attracting the insects.

In *Iris stylosa* markings are a sign for a bee to crawl in under the stigma below which is the stamen. This prevents self-pollination.

The bright orange and blue Strelitzia flower is pollinated by a bird with the same colouring, exposing the pollen when the blue tongue is split by the pressure of the bird on it.

The elbow orchid labellum imitates an insect. Apparently an insect comes in to kill the other "insect".

Eriostemon myoporoides stamens have flat stalks blocking insects from crawling between them below the stamens. Cultivated Marguerites produce no seed, and Mr. Swaby has never seen seed in *Viola hederacea*.

Prostanthera stamens form a top arch over a landing platform, and the head of the insect touches the stamens, so getting pollen on itself. Later the styles bend into position.

In double flowers, some are making stamens *or* petals, some having an anther on one side. The single flowers are the natural ones.

Mr. Swaby ended his talk with beautiful slides of *Darwinia micropetala*, Wallflower fruits shedding seeds, and a skull-like Snapdragon capsule.

The President thanked Mr. Swaby for the most interesting talk, and Mr. Ian Morrison for projecting the slides. Members showed their appreciation by enthusiastic clapping.

The President announced that the Western Victoria Field Naturalist Association Quarterly Meeting will be held at Hamilton on 26 October.

They propose that clubs get together more than they do, and so make stronger representations on important issues.

The report by Professor Turner on the Norfolk Island Survey for the Australian Conservation Foundation is now on sale.

The Secretary and President went to Maryborough and met representatives of the Nature reserve there, where a new fence has been erected. They reported that another fence needs replacing. A number of native flowers were out.

Mr. Woollard asked for information of the proposed association of various clubs, and asked if it isn't possible to do this within the orbit of the F.N.C.V.

The Secretary announced that he had forms for the Council of Adult Education Week from 26 Oct. to 2 Nov.

He also asked for names of possible speakers to address general meetings next year. He appealed for organizers for the members' night in January.

He said that it was desirable that some land at the top of Mt. Eliza be preserved. Much is being developed. Some should be bought for preservation. Thirty-five years ago Mr. Swaby suggested to a friend in the Horsham district that some land should be kept and that is now a 20 acre reserve that has never known axe or fire. It has been handed to the Lands Department with a Committee of Management formed. It is known as the John Smith Memorial. The shire will see that it is looked after.

Mr. D. McInnes announced that the new Victorian Flower Book can be obtained from Miss Allender, Mr. Woollard, or himself.

Mrs. North said she had recently visited the Lion Park in N.S.W., and found that the lions were fed on 60% horse meat, 30% diseased beef from the C.S.I.R.O., and 10% kangaroo meat.

Mrs. Hellison asked that the Club register a strong protest against the idea of lions in the Dandenongs.

Mr. Woollard pointed out that a newspaper report said that Mr. Hamer was against the idea of a lion park there.

Mr. McInnes suggested that a letter from the Club be written to Mr. Hamer congratulating him for preventing the establishment of a further quarry at Cape Woolamai.

Mr. Lewis said that on a trip to the Grampians with the S.G.A.P. he saw bulldozers from Plantation Road and survey pegs on the mountain side of the road.

Mr. Allan said that he would send a query to the Stawell F.N.C. for details about this.

Mr. J. Baines pointed out that although the whole of the Grampians was under the control of the Forests Commission, and the general idea was they would protect the area, it could be adequately protected, only if it was a National Park.

Exhibits included a collection of King Island wildflowers by Mrs. E. Bennett.

Mr. Swaby brought native plants in flower, garden grown, and from the Grampians:

Phylloglossum drummondii (Pigmy Club moss)

Stylidium calcaratum (spurred trigger plant)

Centrolepis strigosa (wiry centrolepis)

Centrolepis aristata (pointed centrolepis)

Drosera glanduligera

Myoporum montanum

Myoporum acuminatum (water bush)

Botany Group Meeting

10th October

Seventeen members attended, and in the absence of Mr. Fairhall, Mr. Bruce Fuhrer presided. Miss L. White's talk, "Which Generation?" began with comments on DNA. Then she described, with the aid of excellent diagrams, the equal division of cells in growth, and contrasted it to the reduction division that occurs at the formation of reproductive cells, i.e. sex cells in animals, or many types of spores in plants.

Miss White said that most plants and all the higher plants have an alternation of generations. One generation, the haploid gametophyte, produces the male and female gametes. From the union of a male and a female gamete there develops the next generation, the diploid sporophyte. The spores from the sporophyte are haploid and develop into gametophytes, and so on.

After describing the alternation of generations in several plants (fungi, mosses, ferns, etc.), Miss White ended with the flowering plants. Flowering plants are the sporophyte generation and they produce two kinds of spores, but the gametophytes that develop from these spores can be observed only with the aid of a microscope, and they are retained within the sporophyte. The ovule is a spore that develops a female gametophyte, and the pollen grains are spores that develop male gametophytes.

Mr. Fuhrer on behalf of members thanked Miss White for her very informative talk.

The meeting concluded with the inspection of exhibits of flowering plants and cryptogams.

Microscopical Group

July, 1968

This meeting took the form of an open night to introduce microscopy to students of secondary school level. Invitations were sent to various metropolitan schools.

The subject was introduced by Mr. K. Trotter, who explained the basic principles of the microscope. He advised on precautions to be observed in deciding on type of microscope, and the scope of work the student requires to do with it. His remarks were amplified by indicating the various fields of investigation that are open to the interested microscopist, with particular reference to Mr. Trotter's own specialty—the study of diatoms and methods of arranging them on slides (which were demonstrated under several micrscopes he had on exhibition). Later he gave a demonstration of sealing cover slips on slides by the process of ringing.

Mr. D. McInnes, with brief introductory comments, then followed on by de-

monstrating a process of making rock sections suitable for examination under the microscope. He particularly emphasized the simple method of hand grinding, using oil stone or grinding powders, which was inexpensive and within the capacity of most people with a little patience.

The various methods of viewing the finished slide using transmitted light and plane polarized light were also explained.

Exhibits to demonstrate the field of microscopy were shown under several microscopes. A short description of them was given by each member concerned.

Mr. C. Nance—Section of Pine stem differentially stained. The stains so used were also described.

Mr. Carl Meyer—Stained section of Schinus Molle. The structure was described in detail.

Mr. W. Genery—Lepidurus jaws, with reference to outstanding points of interest, i.e. dessication of eggs, etc.

Mr. P. Genery—Fairy Fly and a stained Cladocera.

Mr. James Milojkovic—Silico-Flagellates under microscope. Also model exhibit of these and other diatoms.

Meeting closed after viewing of all exhibits by visitors.

August, 1968

Mr. J. Davies presided over this meeting with twenty members present. The forthcoming Nature Show, requirements for the group's exhibit, the availability of equipment and personnel to demonstrate and advise, was the subject of early part of discussion.

Mr. James Milojkovic was congratulated on his success at recent Schools' Science Quest, with his exhibit on subject of diatoms.

Mr. P. Genery gave a short explanation of Chlorophyll pigments in plants, referring specially to its influence on colour of Algaes.

He also had on exhibit a Japanese-made microscope, and illustrated its power of resolution at 75X on a micro-photograph giving 20,000 lines per inch.

The following specimens on view under the microscopes were described by the respective members—

Mr. R. Strong — Planarium Worm (*Dugesia lugubris*). Sometimes referred to as Ghost Worm, collected from Albert Park Lake, March, 1968.

Mr. C. Nance—Transverse section of stem and root of Pine, stained with iodine green and acid fuchsin. An old but very effective method of staining, wherein the green contrasts with the red. A very good section 40V 20X. The accompanying diagram added considerably to the explanation, especially for younger students.

Mr. Carl Meyer—Section of Fatchedera, an hybrid between Ivy and Eraleacea.

Mr. J. Strong—Larvae of fly mounted alive—Polyvinyl Lacto-Phenol. Found prevalent in water of high salinity where solubility of oxygen is small. Shows pair of tails and two trachea tubes.

Mr. J. Milojkovic and Mr. K. Trotter—4 microscopes with slides of the following: 1. Flagellata; 2. Diatoms: 3. Radiolaria; 4. Sponge Spicules. Also a model of Diatoms as exhibited in Science Quest.

Mr. P. Genery—Marine Medusa. One untadi variety from marine plankton collected 5 years ago and kept bottled. A new specimen of Fresh-water Medusa. Attention was directed to 4 bundle of denticles. This was mounted on a slide, stained in Haemotoxylin, and brought up through alcohol. This Medusa was also recorded by Microscopical Society in 1923.

January Meeting, 1969

Members who intend taking part at this "Members' Night" meeting, please advise Mr. E. Hanks of their subject before the end of December.

F.N.C.V. DIARY OF COMING EVENTS

GENERAL MEETINGS

Monday, 11 November

2. Minutes, Reports, Amendments.
2. Correspondence.
3. Subject for the evening—"Caves and Caving". Mr. Ellery Hamilton-Smith.
4. New Members

Joint Ordinary:

Mr. & Mrs. M. R. O. Millett, 72 McNicol Road, Tecoma, Vic. 3160. (Interest—Botany (Eucalypts).)

Ordinary:

Mr. R. Chapman, 3AW, 382 Latrobe Street, Melbourne 3000.

Country:

Mr. Ian H. Bennett, 55 Brantome Street, Gisborne 3437. (Interest—Mammal survey.)
Dr. H. B. Holmes, 24 Ferrers Street, Mt. Gambier, S.A. 5290. (Interest—Eucalypts, Marsupials, Native plants.)

Affiliated:

Upper N.E. Field Naturalists Club, C/o High School, Beechworth 3747.

5. General Business.
6. Nature Notes and Exhibits.

Monday, 9 December—"Wildflowers of the North". Mr. A. Morrison.

F.N.C.V. EXCURSIONS

Sunday, 17 November—Mornington Peninsula. Leader: Mr. T. Sault. The coach will will leave Batman Avenue at 9.30 a.m. Bring two meals. Fare $1.50.

GROUP MEETINGS

(8 p.m. at National Herbarium unless otherwise stated)

Thursday, 14 November—Botany Group. Miss Helen Aston will speak on "Botanical Terms and Keys made easy".

Wednesday, 20 November—Microscopical Group.

Friday, 29 November—Junior meeting at 8 p.m. at Hawthorn Town Hall.

Monday, 2 December—Entomology and Marine Biology Group. This group meets in Mr. Strong's rooms in Parliament House. Enter through private gate at south end of House.

Wednesday, 4 December—Geology Group.

Thursday, 5 December—Mammal Survey Group at Fisheries and Wildlife Dept. Library, 7.45 p.m.

Friday, 6 December—Junior meeting at Rechabite Hall, 251 High St., Preston, at 8 p.m.

Preliminary Notice

26 December to 1 January—Traralgon. Accommodation has been booked at a Traralgon Motel and the party will make day trips to places of interest, such as Mt. Erica, Walhalla, Tarra Valley, etc., in conjunction with the Latrobe Valley F.N.C. The coach fare will be $16.00 and should be paid by the end of November, cheques being made out to Excursion Trust. Price quoted by the motel is $5.00 for Bed and Breakfast and the evening meal is available *à la carte* in the dining room. Motel charges are to be paid individually, but bookings made through the Excursion Secretary.

Field Naturalists Club of Victoria

Established 1880

OBJECTS: To stimulate interest in natural history and to preserve and protect Australian fauna and flora.

Patron: His Excellency Major-General Sir Rohan Delacombe, K.B.E., C.B., D.S.O.

Key Office-Bearers, 1968/69

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Hon. Librarian: Mr. P. Kelly, c/o National Herbarium, The Domain, South Yarra, 3141.

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Geology: Mr. T. Sault, 9 The Avenue, West Rosebud.

Microscopical: Mr. M. H. Meyer, 36 Milroy Street, East Brighton (96 3268).

Mammal Survey: Mr. P. Homan, 40 Howard Street, Reservoir 3073

Entomology and Marine Biology: Mr. J. W. H. Strong, Legislative Council, Parliament House, Melbourne, 3002.

MEMBERSHIP

Membership of the F.N.C.V. is open to any person interested in natural history. The *Victorian Naturalist* is distributed free to all members, the club's reference and lending library is available, and other activities are indicated in reports set out in the several preceding pages of this magazine.

New Rates of Subscriptions for 1968

Ordinary Members	$7.00
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Subscribers to **Vict. Nat.**	$5.00
Affiliated Societies	$7.00
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The cost of individual copies of the **Vict. Nat.** will be 45 cents.

All subscriptions should be made payable to the Field Naturalists Club of Victoria, and posted to the Subscription Secretary.

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F.N.C.V.

the VICTORIAN NATURALIST

Vol. 85, No. 12 December, 1968

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* * *

To all readers and contributors, may the Council express their wishes for a peaceful Christmas Season, and a successful year ahead; and from the Editor—thank you to all who have contributed and helped during the past year.

The Victorian Naturalist

Editor: G. M. Ward
Assistant Editor: P. Gahan

Vol. 85, No. 12 5 December, 1968

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Front Cover:

Readers will very likely have been aware, during recent weeks, of newspaper reports concerning an area in Western Victoria, known as the Little Desert. One of the inhabitants of the area is Mitchell's Hopping Mouse, shown in the photograph taken by Graham Pizzey.

Australites (Tektites)
The How, Why, and Where

by KENNETH TROTTER*

It is now some five years since I walked into Dr. Baker's office, C.S.I.R.O., Melbourne University, and caught a contagious complaint I call "Tektomania". Since that day I have been visiting the Pt. Campbell area on almost every public holiday, searching for these extraordinary curios of nature which have baffled the science world for over one hundred and sixty years.

Tektites are natural objects of impure silica glass and are found in a thin belt approximately two thousand miles wide, which follows a path halfway around the world. Starting in Northern Tasmania and travelling in a north-west direction through Australia, China, Malaysia, Czechoslovakia and America. The word Tektite comes from the Greek word *tektos*, meaning "molten"). The names given to Tektites follow the nomenclature system, hence Tektites from America are called "Amerikanites"; Moldau River, Bohemia, "Moldovites"; Island of Billiton, "Billitonites"; and Australia, "Australites".

Tektites are found in many shapes and sizes from $\frac{1}{8}$ in. to 6 in. or more. The most common in Australia are about 1 in. diameter. The shapes most commonly found are button, canoe, core, disc, dumbell, lens, peanut and bubble.

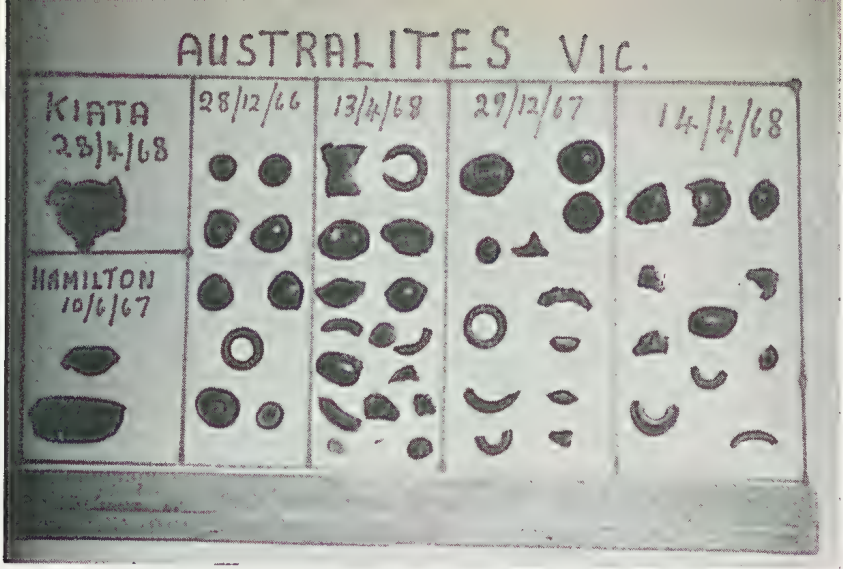
As yet, Tektites have not been used for industrial purposes by modern man, although they have been used occasionally in jewellery. However, aboriginals have been known to use them in their religious ceremonies as decorations, and also as knives during the circumcision of young tribesmen. Emus have been known to swallow them, perhaps to aid their digestion of food.

The flow pattern and shape of Tektites is of great interest to the modern aerodynamicists, as they show how various shapes are made from a molten material when it passes through the upper atmosphere at supersonic speed. The true origin of Tektites is still as yet unknown; however, there are many worthy original schools of thought which I feel are worth mentioning.

Dr. George Baker, D.Sc. (formerly with C.S.I.R.O. and now Curator of Tektites, London Museum), whose monograph apears in the *Memoirs of the National Museum of Victoria*, No. 23, 1959, has without doubt, published in this, the most comprehensive work yet written on the subject. Dr. Baker adheres to the theory of meteoritic origin, and also suggests that because of the variation of the shapes found throughout the world, the angle of entry required to form these shapes suggests that they would have come from the moon or moon area.

The late E. J. Dunn published an article in 1914 stating that his theory on Tektites is that they are of volcanic origin. However, his volcanic bomb and bubble hypothesis was shown to be incorrect by Skeats (1915), who showed that Dunn's theory was base on an incorrect chemical analysis. Other theories suggest that they were manufactured, even by early man, but this is hard to accept, as early man would have had to have access to heat exceeding 1,300° C.

* (Microscopical Society of F.N.C.V.)



Photograph showing some of author's collection. *Photo*: Author.

Another theory is the conflagration of plants, or the burning of coal seams; however, the chemical make-up of Tektites disproves these theories, because Tektites have no potash or phosphoric acid in them. The "Concretion" theory, too, cannot be accepted for similar reasons.

There was a school of thought that suggested creation by fusion of dust particles in the upper atmosphere by lightning, similar to "Fulgurites" (sand fused into long tubes when struck by earthed lightning).

The age of Tektites is also an interesting point, for radio-active and argon tests show a birth date of thirty-one million years ago, but the "fall" on the earth was some seven to twenty-five thousand years ago, according to geological evidence. Tektite fields are found in Czechoslovakia, China, Africa, Texas, Peru and Australia. They are also found in some smaller islands near these countries. We in Australia are very fortunate because the Tektites found aroud Pt. Campbell area offer some of the world's finest and best preserved examples, including perfect buttons which are the most uncommon throughout the world.

Over the past few years many people have shown me objects thinking them to be Tektites. Such objects as lydianite, charcoal, limonite, plant seeds, buckshot (maghemite), and even sheep droppings, have been sent to me by post for recognition. This can be an embarrassment when one has to return a written report minus the crushed contents.

Tektites are black in colour and have a glassy appearance which may have been scratched or worn by sand and weather. If held up to the light, a greeny yellow, semi-transparent section may be seen at the edges where they become thin. Tektites are brittle, and will shatter or chip if struck or crushed.

During my many visits to Pt. Campbell in search of Tektites, I have made many friends among the local people who go "Tektiting" for the fun of it.

Mr. Lawson and his sons have a dairy farm about twelve miles west of Pt. Campbell, and they have on several occasions, amazed me with their skill in collecting an average of one Tektite every fifteen minutes. Mr. Jim Beard, a C.R.B. foreman who lives in Princetown, tells of pocket filling within the hour. Personally, I think

he only gives up when they become too heavy to carry: I have seen small tins full of them at his home, and he, too, has taught me a great deal in the technique of searching over the past few years.

Many romantic stories are told about "the one that got away." Mr. Robins, a farmer at Pt. Campbell, tells of a house that was burnt to the ground containing a Tektite as big as a cricket ball which stood on the mantel shelf, but even to this day the Tektite has never been found. Mr. Robins has several fine examples of Tektites, including a perfect button found near a haystack close to his house. He is one of only two people I know that have found two pieces of a single Tektite at different times.

On many occasions I have taken people to different hunting grounds, and I find that young people in the twelve to fifteen-year-old group do best. I think the reason for this is that their eyes are closer to the ground, and therefore are in better focus than a taller person. My young friend, Paul Harris, aged thirteen years, found twenty Tektites in three days. He also found five Tektites on a small piece of ground that six people, including myself, had just looked over. I find that each year my own findings increase.

To give the reader some idea, my latest effort was over five days, when I found twenty-four on the first day, twenty the next, fifteen, then eleven on the last day. This is more than double the numbers I have found in previous years. The greatest number I have known to be found in one day, was by a party of three people finding seventy. However, I must say in all fairness to readers who may be contemplating this engaging work, that in the past I have searched out new areas for as long as ten days without finding one single Tektite.

I now have one hundred and fifty Tektites in my collection, and only a few of these were given to me. At the moment I am conducting research work on a piece of land at Pt. Campbell, approximately 30 ft. by 120 ft., where I found twenty-four Tektites in a single day; and each day I revisited this small area, I averaged another two. I cannot explain this, except to say that I have placed several coiled wires at ten feet intervals on the surface of the ground, and this has shown that the ground surface can move as much as ½ in. in one day after heavy rain. The soil in this area is made up of quartz sand of a grey blue colour, and has a slope of about 60°. The Tektites I have found in this area are indeed most interesting, as 90% are in good condition, while the other 10%, found only inches from the others, show almost total destruction by chemical and weather conditioning. I find this strange as they are all found on the same layer of ground. It is my opinion that this important evidence puts a question mark in front of local chemical destruction. I am of the opinion that weathering is responsible for the majority of destruction of Tektites.

I have in my collection several examples showing how the local soil acts as a wedge, in levering off the flanges, and opening up cracks caused by the expansion and contraction from the fluctuating atmospheric temperatures.

As for my own theory on the origin of Tektites, I accept the meteoric one, and would like to add that because of the presence of carbon in Tektites, there may be some kind of animal or plant life living on the planet of origin.

No doubt many readers will want to know how to go about "Tektiting". I am asked this question on many occasions, so for these people I should like to suggest the following:

Scan the ground about ten feet

ahead, then examine this area closely about eighteen inches from your feet as you walk forward. Look for an area where the stones and pebbles stand high and are well washed; muddy areas are not good to search on as Tektites sink and get covered by the soil. When you find a Tektite, make a mark on the ground and search around this area for at least fifteen minutes, for I inevitably find two or three more very close to where I find the first one. One should make a rough map of the area in which they are searching, and give each find a number. Write this number on the map for future reference. Tektites are best cleaned in 50% nitric acid*, and then put through a sonic vibrating bath; or by the use use of a stiff brush with soap and water. Care should be taken as flanges can be broken with rough handling. I display my collections in a shallow box which has a layer of plasticine in the bottom about $\frac{1}{8}$ in. thick. This method allows the Tektites to be removed and inspected, and it also holds them secure and prevents them from being chipped or crushed.

Good hunting, friends.

* Important—Add nitric acid to water for dilution to 50%, *never* add water to acid.

VICTORIAN ORCHIDS No. 14

Brown Beaks

by C. E. Gray

Most orchids betray their presence by their leaves, even when they are not in flower. An exception is the Brown beak, *Lyperanthus suaveolens.* Its leaves are so stiffly rush-like and dark green that they pass un-noticed until the tall flower stem rises 18 inches or more with its number of flowers.

The un-opened bud is very much the shape of a bird's beak, and may account for the common name. The sweetly scented flowers are usually dark reddish-brown with a yellow labellum which is rather waxy in appearance. However, I have found colour variations from the darkest nigger brown, through cinnamon, to wholly yellow. The stem is quite stiff and dark, and each flower nestles in a small pointed bract.

Lyperanthus suaveolens is widespread in open forest country quite close to Melbourne and eastward, in both mountain and coastal areas. Recorded also for Tasmania, N.S.W., and Queensland, it flowers in the Spring.

Another interesting feature of *Lyperanthus* is that the various species have entirely different types of leaf. Victoria has one other species. It is a more showy plant but is a shy flowerer. The large, round, leathery leaves found growing flat on the ground in sandy places, and often in extensive colonies are those of *Lyperanthus nigricans.*

Readers' Nature Notes and Queries

These columns are available for all members, young and old, to bring before others their own observations in nature. Correspondence may be sent to the Editor, 54 St. James Road, Heidelberg.

Satin Bower-birds

Mr. O'Donnell of Greensborough, who visited the Ovens Valley district during September last, writes regarding the unusual presence of satin bower birds (identification assumed from the information and illustrations given on page 157 in Robin Hill's *Australian Birds*.

Last week it was my good fortune to observe at close range a group of four such birds in a friend's garden, only about six feet away from a window overlooking the north side of the house in Wandiligong.

These bower birds appeared to be all the same sex (perhaps there were two pairs) as all seemed the same colour and size. I was told that these birds came nearly every morning about 9-10 o'clock to go through their performance of bower building (and bower destruction), prancing about, gathering violets from nearby, as well as collecting many leaves of the silver queen holly tree (presumably the variegated holly leaf attracts the birds).

In this Morse's Creek valley near Bright there are now flock proportions of bower birds. Some residents complain of the destructive habits of the birds—pulling camellia flowers off trees, and pecking oranges among other things.

I have been visiting Wandiligong periodically over the past 20 years, but have not seen bower birds there before, although local residents have informed me that the birds have come about homes occasionally in the past, but this year seems to have brought great numbers of them. Bower-bird year!

What is the likely reason for these birds venturing so near houses at such frequent intervals? Food-seeking can hardly be the answer. Where do the birds usually induge in bower-building? Would the abnormally wet winter (I think this is correct to claim) have something to do with inducing bower birds to forsake their usual haunts in this N.E. district of Victoria?

Dweller Underground

This spider story comes from Mr. G. Fellows of Alabama Hill, Charters Towers, North Queensland.

Passing along a track which had broken earth along the edge, a hole an inch and a quarter in diameter, and black with shadow caught my eye. I had passed that spot just near dusk the previous evening, and no hole was there then; yet roughly twelve hours later, this small mound of soil with many grains of match-head size, and about a small cupful in quantity, had appeared. Many creatures make holes here among the numerous rock areas, but this was different.

Plucking and stripping a foot-long Natal Grass stem, I slowly depthed the hole. When a few inches below the surface, a quick grip and tug on the grass-stem told of someone "at home". Slowly withdrawing the grass and meeting with some resistance, I had the stem just clear of the hole-top, when four huge, very hairy legs appeared, and a great head with jewel-like eyes; only to disappear again in a moment down the hole.

Momentary as the appearance had been, it was sufficient to indicate an enormous spider; but no trap-door or other species common about here looked like this spider.

After several probings, and consequent efforts on the spider's part to find the nature of the intruder, just a few quick glances were obtained of most of its body.

Entirely covered with hairs, the legs when rarely spread, suggested great strength, and the abdomen was of massive proportions also.

Now began my night vigil; and armed with camera and flashlight cocked for action, and well after darkness had fallen, I made a stealthy approach to the vicinity of the hole. After a long wait in a cold wind, and then having only seen a lightning disappearance of a half-head and four legs, I flashed a torch-light down the hole (a depth of four inches on test), which showed the reflection of light from the spider's eyes,

but no efforts on my part could make the spider come up her shaft again.

Two days later, the hole having been carefully covered by a perforated wire tea-strainer to keep away prowling mason-wasps, a few fine web threads were spun across the entrance. Then, a week later, on examination, only a renewal of cross-threads occurred, and never any attempt was made to line the hole which was entirely bare from the top to the little side excavation at the bottom. This was where the spider rested by day, with only a "toe or two" showing.

Only once have I seen a larger earth-dwelling spider, and that was some time ago when an earth filling of a garage floor area also developed an inch and a half diameter hole overnight. Walking on the earth area next morning, a hairy brown mouse-like body was half out of the hole.

Grasping a stick I advanced to strike, only to find it was a huge spider already dead. I wondered even then why the creature was dead, as after carefully wedging it into a big matchbox, the legs protruding, I could see no injuries on it. Then I remembered that all through that earth were sulphide compounds and other mineral matter from an old mining dump that gave off a sulphurous smell after rain had fallen. Therefore, mineral-poisoning may have caused the spider's death. No one here had seen that type of spider before. The one I am now studying is similar, and time and constant watching alone will reveal more of its habits and life story, in part at least. I have made its whereabouts taboo to all who come near. Although no "pets" of mine, I will allow no spider to be "butchered" so as to leave one ignorant and unsatisfied. Both spider and I will await the future, and I at least will gain patience in doing so.

How Fast does a snake crawl?

This question of course is ambiguous; but by being a little more specific, and adding a few qualifications, we can arrive at a reasonable conclusion.

About 2 weeks ago, when travelling between Benalla and Glenrowan, I was resting off the road when a Brown Snake appeared about 20 feet away, having presumably crossed the bitumen road. By the time I was aware of the situation and able to time the snake over an estimated 20 feet distance, it was travelling on well consolidated gravel, with short dry grassy tufts. This provided reasonable traction for the belly scales. The temperature was about 75°F, with bright sunshine, and the ground was quite level.

Figures obtained were these:
distance travelled = 20 ft. (approx.)
time taken = 5 secs.
This gives a speed of about 3 m.p.h.
(30 m.p.h. = 44 ft./sec.)

Comments welcome!

[Ed.]

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Ecological Studies of Tunnel Cave, Mt. Eccles

KAY L. JOHNSON*
G. McK. WRIGHT*
D. H. ASHTON*

Caves are biologically and ecologically interesting sites because their microhabitats are so different from those of their surroundings. The geomorphology of basalt caves in the Mt. Eccles and Mt. Napier lava flows in S.W. Victoria has been studied by Ollier and Brown (1964) and the vegetation in the latter area has been described by Beauglehole and Learmonth (1957). Ferns were shown by the latter authors to be a striking feature of the caves and 20 species were recorded; each cave tending to have its own distinctive assemblage. The dispersal of spores of many delicate moss and fern species over long distances of relatively dry country and their establishment in very specific sites is an interesting problem.

During the senior ecology excursion to Mt. Eccles in March 1968 a detailed study was made of Tunnel Cave because of the many interesting features that were evident. The cave is located in the Mt. Eccles National Park, and permission to carry out research was kindly granted by the National Parks Authority and the Committee of Management of the Park.

Description of the Cave

The cave is situated on the northern flank of the canal—a trench-like depression formed during the Early Recent eruptions of the volcano, perhaps 5-10,000 years ago. (Pers. Comm. E. D. Gill), The cave is about 200 feet long with a turn in direction from north to north-west about half way along its length. The entrance is about 7 feet high and 5 feet wide and the cave floor, for the first 40 feet, is a boulder-covered ramp which levels out 20 feet below the entrance. The roof is arched up to a maximum height of 24 feet above the horizontal floor and gradually descends to a few feet at the innermost regions (Fig. 1). The occurrence of old lava levels and basaltic stalactites suggests that the cave was formed by the progressive withdrawal of fluid lava (Hills 1960, Ollier and Brown 1964).

Environment

The microclimate in the cave is certain to be well buffered from seasonal and diurnal fluctuations because of the small entrance and the southerly aspect. The microclimate was studied along surveyed lines in the cave during the early afternoon of a sunny day in which there was occasional cloud and a S.W. breeze.

(a) *Temperature and Relative Humidity*

Air temperature decreased relatively sharply from 68°F in the open to a value of 55°F. 40 feet from the entrance (Fig. 2). Relative humidity, on the other hand, increased sharply from 50% at the entrance to 90% over this distance. Thereafter the relative humidity gradually increased to nearly 100%, although the temperature was constant. A relatively sharp increase in relative humidity occurred just beyond the turn in the cave at 100-120 ft.

* Botany School, University of Melbourne.
The following ecology students carried out this project: Kay L. Johnson, Pauline Y. Bennett, Vivian C. Anderson, M. R. Beazer, I. A. Crump, Judith A. Odgers, G. McK. Wright, P. L. Connell, D. W. Flinn, R. J. Hill, P. Greig, G. J. Squires, were final year students of the Forestry School.

(b) *Light Intensity*

Light intensity was measured at 4 ft. above the floor with a selenium cell held so as to receive maximum illumination. Although the outside light varied with the passing of occasional clouds the interior of the cave showed little fluctuation at any point, due no doubt to the fact that light entering the cave was chiefly skylight or reflected from clouds. The general features shown by the isolines in Fig. 3 indicate a dramatic reduction of light intensity with distance from the entrance. Protruding areas of rock cast deep shadows near the entrance and along the walls. Owing to the optical geometry of the cave illumination was very greatly reduced above a height of about 10 feet from the floor. Only faint light was reflected from the dark walls and very little light penetrated beyond the turn in the cave. No light was recorded on this day beyond 150 feet.

Vegetation

The vegetation consists of filmy ferns, mosses, lichens and algae. It is found on both walls from floor level to 10 or 12 feet and from 3-10 feet from the entrance to a distance of 55-80 feet. It is best developed in areas of the wall which are damp and have a veneer of decayed rock and pockets of deeper clayey soil (Fig. 4).

(a) *Zonation on the west wall*

The most conspicuous patches of vegetation are dominated by a dark green luxuriant felt of filmy fern fronds 1-4 inches long (*Polyphlebium venosum*). Amongst the fronds and in surrounding patches, dense fuzzy pale green masses of filamentous and ribbon-like filmy fern prothalli occur. These were kindly identified by Dr. Ilma G. Stone as those of *Polyphlebium venosum* and *Hymenophyllum* or *Mecodium*. No diploid vascular phase of the latter species was found. The fern distribution is chiefly confined to wet areas of the wall between 35 to 50 feet from the entrance. Small pockets were found up to 80 feet wherever the wall was moist. The moss *Mittenia plumula* is associated with the ferns, but its small fronds are found nearer the entrance, between 20 and 30 feet. The brittle "highly light-refractive" protonema of this moss is more widely distributed up to 55 feet. The brilliant green "fluorescence" of these patches, which is evident when viewed close to the direction of incident light, is due to the special orientation and aggregation of the chloroplasts in the lenticular cells of the protonema (Stone 1961). In 1966 *Fissidens tenellus* was also recorded from this site. Blue-green algae were conspicuous between 15-20 feet as pure patches or mixed with prothalli and protonemata. It is a nitrogen fixing species of the Nostocales (*Anabaena* ?). Unicellular green algae were present on the drier parts of the wall and marked the limits of plant growth between 20 and 80 feet (Fig. 6).

(b) *Zonation on the east wall*

Polyphlebium on this wall occurs from 15-40 feet on relatively dry surfaces, although a small patch occurs in a sheltered wet area high up on the wall only 10 feet from the entrance. Much of the fern on this wall was somewhat desiccated at the time of study. The prothallial stage of this fern also occurred throughout this zone. *Mittenia* again occurred on the side of the fern patch nearer the entrance but was restricted between 15-18 ft. The main difference between the vegetation on the two walls is the occurrence of additional mosses, such as *Lembophyllum, Breutelia* and *Zygodon* on the east wall between 5 and 25 feet from the entrance. The small community of *Lembophyllum* and *Sticta* near the entrance is a link with

moister communities in sheltered places outside the cave. The limits of plant growth on this wall are marked by areas of powdery crustose lichen, although green algae do occur (Fig. 7).

(c) *Discussion*

The distribution of the zones of vegetation appears to be a resultant of substrate moisture, atmospheric humidity and light intensity. The absence of vegetation from the proximity of the entrance of the west wall appears to be due to intense shade cast by the lip of the entrance itself. The poor development on the east wall in this region is likely to be due to the dryness of rocks and crevices. In other caves a suite of large ferns is usually found in such sites. The lower humidity would certainly inhibit the development of the delicate filmy ferns in this situation. The furthermost limits of vegetation is reached at 80-90 feet from the entrance at extremely low light intensities. Although the filmy fern occurs chiefly in an intermediate zone, which on this day received between 1/125 and 1/500 of daylight, it did occur as depauperate undivided form where moisture was present 80 feet from the entrance in light intensities of less than 1/1000 daylight. Studies of the compensation point* of fronds in the laboratory showed low values of 0.3-5 foot candles with tungsten lights at 70°F.

In the denser patches of vegetation a mosaic of micro-communities sometimes occurred due to the microrelief of the wall surface, the high angle of incidence of the light, and consequent marked light intensity modification.

The occurrence of *Polyphlebium venosum* in Tunnel Cave at Mt. Eccles and Church Caves at Byaduk (Beauglehole and Learmonth 1956, 1957) is of interest, since its commonest habitat in Victoria is the humid fern gullies and rainforests of South and East of the State. The rainfall of the basalt caves area is 27-29″ per annum and the nearest occurrences of the filmy fern in its gully habitats are in the Grampians about 40 miles north-east.

Root Distribution in the Cave

The depth of the root system is of great importance in the understanding of species survival in dry conditions. The difficulties of investigation of root limits are especially great when roots penetrate deeply into the bedrock.

The depth to which tree roots penetrate varies greatly with the species and the habitat. In wet climates or waterlogged soils they may only reach a few feet, whereas in dry climates with porous soils and fissured or jointed rocks, roots may reach great depths. The greatest depth reliably recorded is that of the mesquite (*Prosopis juliflora*) at 175 feet in gravels in the deserts of Arizona (Phillips 1963). The tap root of *Pinus sylvestris* in Europe may exceed 16 feet, whilst that of *Fagus sylvaticus* reaches only 4 feet (Busgen, Münch and Thomson, 1929). In Australia the fine roots of Mountain Ash (*Eucalyptus regnans*) penetrate deep soil to 16 feet (Ashton 1956) and Jacobs (1955) refers to claims of eucalypt roots in mine shafts over 100 feet.

In the present study roots were observed emerging from joints in the basalt roof and walls of Tunnel Cave at depths of up to 58 feet. Many were living, with eucalypt type fibrous bark, and there is strong presumptive evidence that they are the roots of Manna Gum (*Eucalyptus viminalis*), since this is the only woody plant in the stand above. From Fig. 1 it can be seen that the maximum depth of the root system as seen in the cave is about equal to the maximum height of the trees. The roots were absent near the

* The light intensity at which photo-synthesis just balances respiration.

mouth of the cave and appeared sparsely at about 40 feet where the humidity was greater, although far from saturation on the day of measurement (Fig. 5).

In the inner section of the cave where a change in direction of the tunnel resulted in almost total darkness and an almost saturated atmosphere, root development was copious and extended as curtains 12″ or more long from cracks in the roof and walls. Most of this area was moist and in some places water dripped from the roots and the lime encrusted cracks.

It is of considerable interest that the trees of this woodland are able to draw on moisture supplies in the basaltic matrix of the crater at the end of a drought of such unprecedented severity.

Clearly the knowledge of the limits of the roots of trees in such situations is necessary for the understanding of much of the ecology of the area. It is a matter of further research to discover the size and number of roots necessary to sustain such eucalypts in times of water stress.

References

Ashton, D. H. (1956)—Studies on the autecology of *Eucalyptus regnans*. F.v.M. Ph.D. thesis 1956. University of Melbourne.

Beauglehole, A. C., and Learmonth, N. F. (1957)—The Byaduk caves. *Vict. Nat.*, **73** (12): p. 204-210.

———— (1956)—Ferns of the Portland District. *Vict. Nat.* **73**: 40-42.

Busgen, Münch and Thomson, T. (1929)—The structure and life of forest trees. (Chapman and Hall).

Hills, E. S. (1960)—The physiography of Victoria. An introduction to geomorphology. (Whitcombe and Tombs P/L).

Jacobs, M. R. (1955)—Growth habits of the Eucalypts. (Commonwealth Government Printer, Canberra.)

Ollier, C. D. (1964)—Caves and related features of Mount Eccles. *Vict. Nat.* **81** (3): p. 64-71.

Ollier, C. D., and Brown, M. C. (1964)—The Byaduk Lava Caves. *Vict. Nat.* **80** (9): p. 279-290.

Phillips, W. S. (1963)—Depth of roots in soil. *Ecol.* **44** No. 2: p. 424.

Stone, Ilma G. (1961)—The highly refractive protonema of *Mittenia plumula* (Mitt) Lindb. (*Mitteniaceae*). *Proc. Roy. Soc. Vic.* New Series **72** (2): p. 119-124.

Stone, Ilma G. (1965)—The gametophytes of the Victorian Hymenophyllaceae. *Aust. J. Bot.* **13**: p. 195-224.

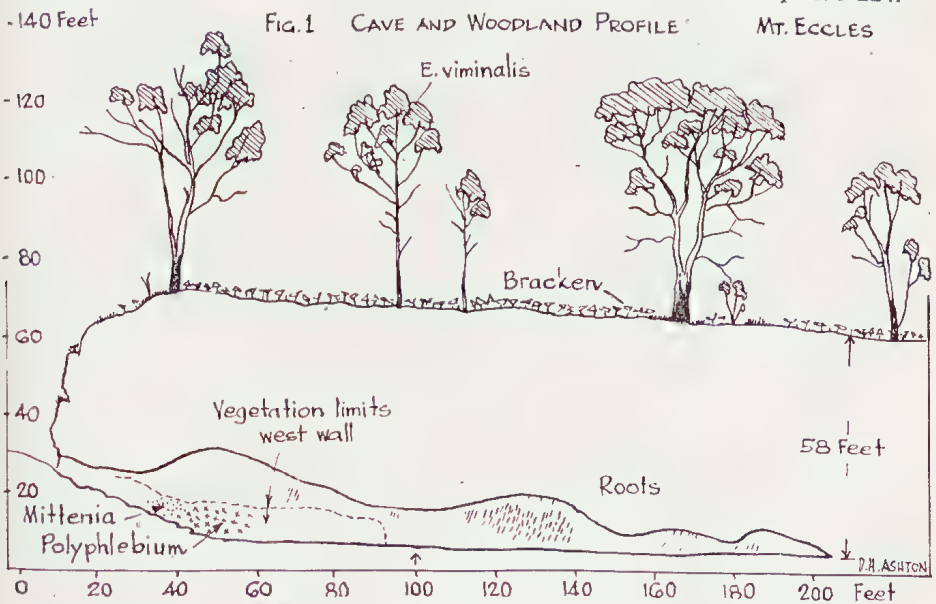
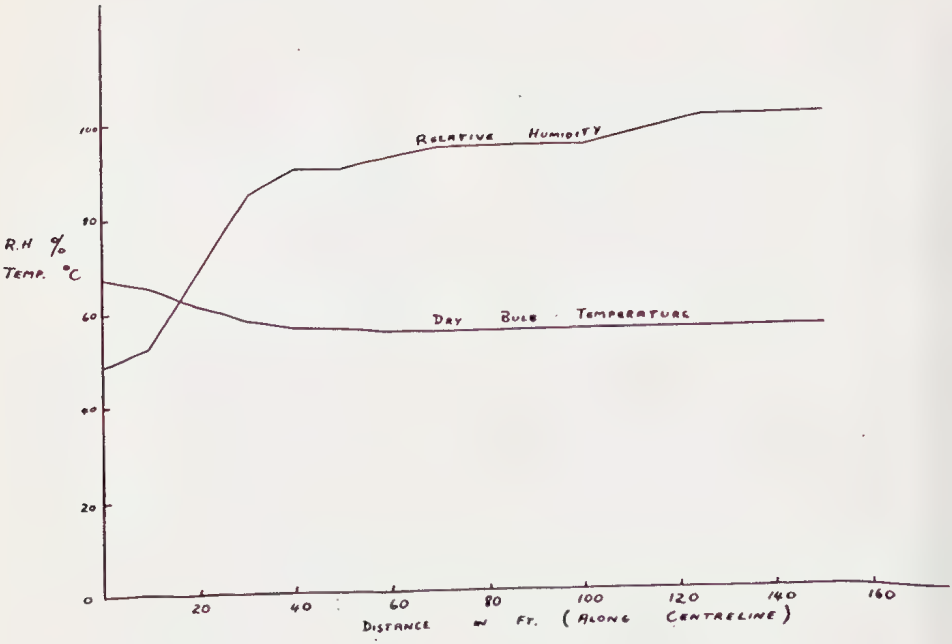


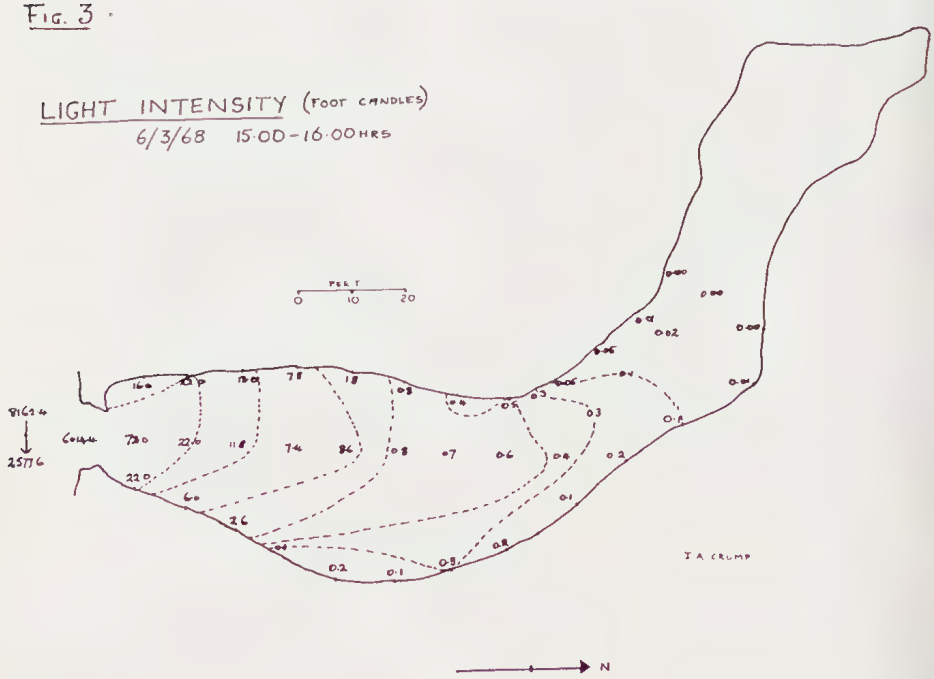
Fig. 1 Cave and Woodland Profile Mt. Eccles

Fig. 2



R.H %
TEMP. °C
100
80
60
40
20
0
RELATIVE HUMIDITY
DRY BULB TEMPERATURE
20
40
60
80
100
120
140
160
DISTANCE IN FT. (ALONG CENTRELINE)

Fig. 3



LIGHT INTENSITY (FOOT CANDLES)
6/3/68 15·00-16·00 HRS
FEET
0 10 20
8162·4
25776
I A CRUMP
N

Fig. 4

GROUND PLAN OF CAVE

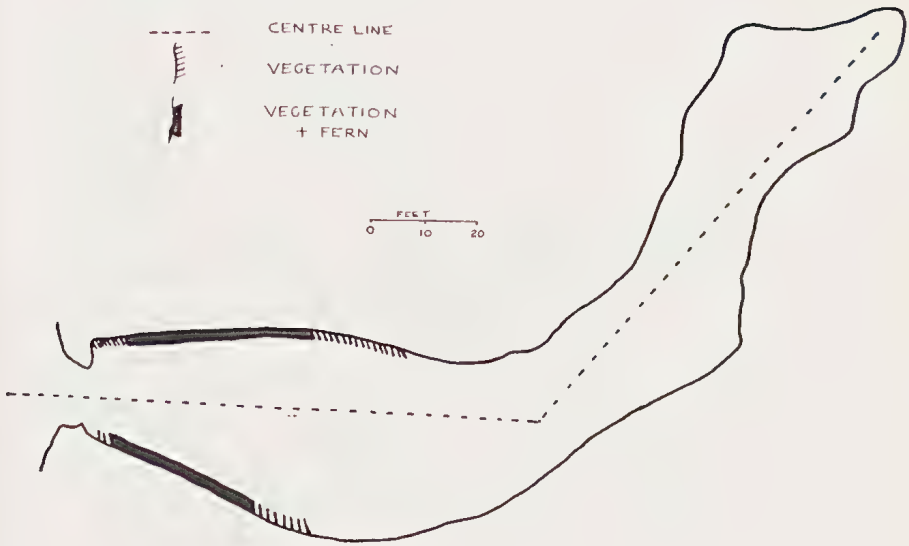
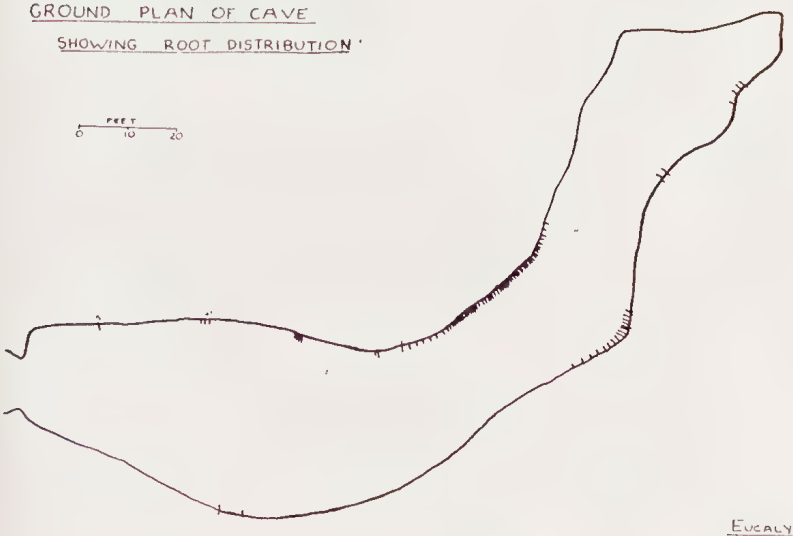


Fig 5

GROUND PLAN OF CAVE
SHOWING ROOT DISTRIBUTION



EUCALYPTUS VIMINALIS
ROOT DISTRIBUTION
PRESENT I
LIGHT III
HEAVY Mul

Fig. 6 Vegetation on the west side of the cave

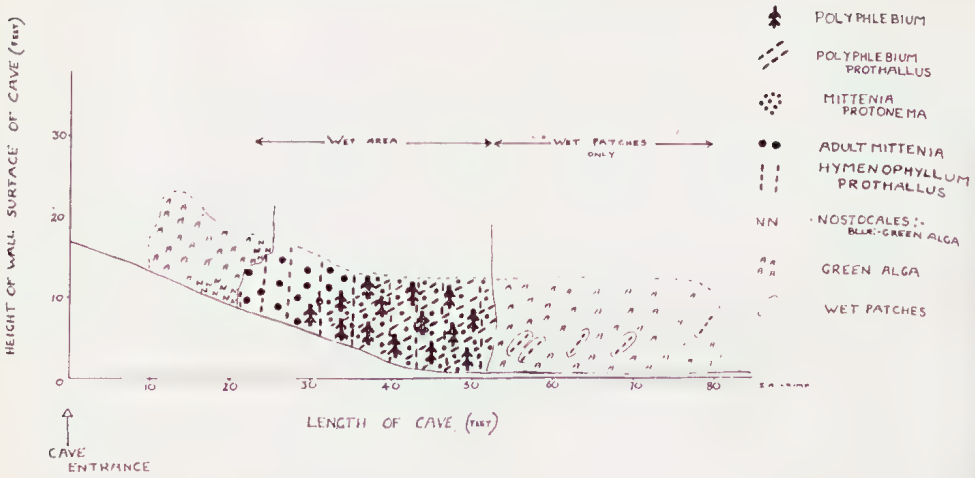
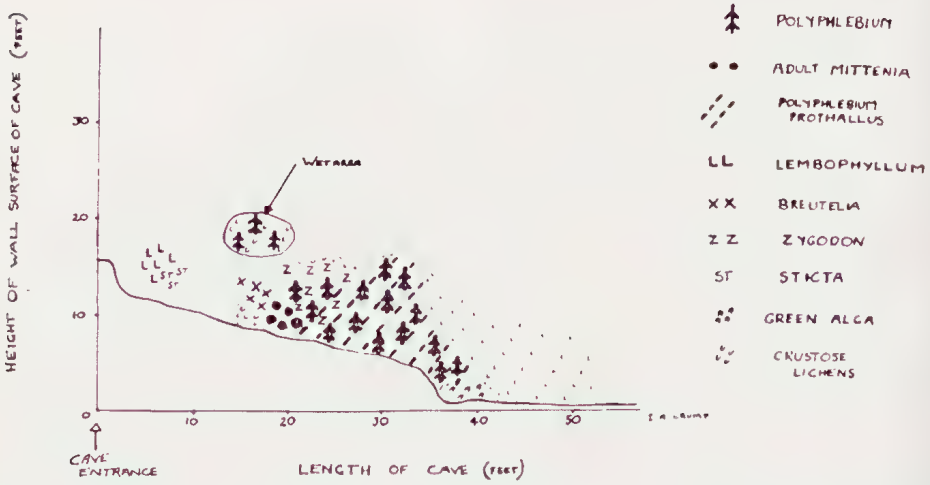


Fig. 7 Vegetation on the east side of the cave



Along Senini's Track

by E. H. Homann

Travelling north on the Moe-Walhalla Road, the Tyers River is crossed, and the road begins to climb. Towards the end of the grade at about two miles from the Tyers, a small signpost on the left marks the beginning of Senini's Track. The road descends steeply through forest country, crosses the Tyers River, and then continues on to join the Tanjil Bren Forest Road.

Knowing that the area had been burnt twelve months ago, Mr. Jim Peterson and I, both members of the Latrobe Valley Field Naturalists' Club, decided that we should examine the area. We spent most of Saturday 19th October there.

Our first discovery was the Tufted Lily (*Sowerbaea junca*). Hitherto we had known of small patches of this plant in the district; one of which was on the eastern side of the Moe-Walhalla Road, about four miles from the present discovery. There were 6 to 8 plants in that locality, the flower stems being relatively few. Plants were found also south of Rosedale. However, along Senini's Track, the plants extended for two and a half miles reaching back in one place for half a mile, and in another, for a quarter of a mile.

Driving along this road reminded me of the display this plant makes along the roadsides between Caloundra and Noosa Heads in southern Queensland. The plants were quite robust, carrying great numbers of flowering heads which caused the roadside in many places to look like a lavender carpet.

Mr. Peterson made the next discovery—blooms of the Orange-tip Caladenia, *Caladenia aurantiaca.* We had found this orchid in two localities in the district prior to this, but these habitats have since been destroyed.

Finally we almost walked upon a large patch of the Lizard Orchid, *Burnettia cuneata.* There were about twenty plants, all wide open in the bright sunshine. The plants were growing in a damp seepage area in association with one of the Hakeas, possibly *H. microcarpa.* Visitors who came to see the plants the following day found smaller patches in the same area of seepage, and later I found a solitary flower in the next damp gully.

Taken altogether this had been a most rewarding drive along Senini's Track.

* * * *

Albinism in the Bent-winged Bat

Miniopterus schreibersii (Kuhl)

by E. Hamilton Smith*

Albinism is rarely reported in bats, so it is of some interest to record an instance in the Bent-winged Bat, *Miniopterus schreibersii* (Kuhl). So far as is known, this is the first case of albinism reported in this species.

The animal concerned is a female, captured at Panmure Cave near Warrnambool, Victoria, by Mr. Fred Shirrefs on January 15th, 1967. The accompanying photograph was taken by the late John Edge, and shows clearly the features of the specimen. It later escaped from captivity and has not since been recaptured. The wing membranes and other hairless areas appear entirely devoid of pigment, and although there is some brownish colouration about the fur, particularly near the head, this may well be due to staining.

Although a completely albino specimen of *M. schreibersii* has not been previously reported, white-spotted or partially white animals are not uncommon. One of the more striking of these was a juvenile female trapped by the present author in Bat Cave, Naracoorte, South Australia, on February 16th, 1962. This specimen had the posterior half of the ventral surface, the posterior half of each wing membrane, and the whole of the uropatagium completely devoid of pigment. It was marked with C.S.I.R.O. band No. 030-46673, but has not since been re-trapped.

It is relatively easy to see why albinistic individuals should be comparatively unusual among the Chiroptera. There is a great deal of evidence that bats are subject to predation by owls, and it seems clear that a white individual would be more readily taken than a dark-coloured one. It can also be assumed that the normal Mendelian pattern would occur in reproduction, and that only one quarter of the offspring of such a bat would also be albinistic. Most bats, and this is certainly true of *M. schreibersii* (Dwyer, 1963) do not breed until their second year, and then generally only give birth to a single young in any one year (McKean & Hamilton-Smith, 1967). Hence, the white bat, being likely to be more readily taken by a predator, may not survive long enough to produce a white offspring.

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Albino Bent-winged Bat (*Miniopterus schreibersii*)

Photo: John Edge

However, one of the instances of albinism described by Allen (1939) suggests that this may occur. Allen describes only six instances of albinism, while Dubkin (1952) reports at length on an albino *Myotis lucifugus* which he observed over a long period. Other recent reports in the literature are those of Heatwole *et al.* (1964) on *Molossus fortis* and of Linares (1967) on *Anoura caudifera.*

The author is indebted to the family of the late John Edge and to Mr. Fred Shirrefs for making this photograph available for publication.

References

Allen, G. M. (1939). Bats. Harvard Univ. Press.

Dubkin, L. (1952). The White Lady, Macmillan, London.

Dwyer, P. D. (1963). The Breeding Biology of *Miniopterus schreibersii blepotis* (Temminck) (Chiroptera) in North-eastern New South Wales. *Aust. J. Zool.*, **11**: 219-240.

Heatwole, H., Arroyo-Salamán, J. F., & Hernández, G. (1964) Albinism in the bat, *Molossus fortis. J. Mammal.*, **45**: 476.

Linares, O. J. (1967). Albinism in the long-tongued bat, *Anoura caudifera. J. Mammal.*, **48**: 464-465.

McKean, J. L., & Hamilton-Smith, E. (1967). Litter size and maternity sites in Australian bats (Chiroptera). *Vict. Nat.*, **84**: 203-206.

Isopods in Victoria

by W. F. SEED*

Introduction

Most readers of this journal would be able to recognize, as members of that group, quite a number of the animals known collectively as the Crustacea; but they might have some difficulty in explaining to anyone else just what a crustacean is, and how to recognize one with certainty.

Crustaceans are found on land, in still and running fresh water, in mineral and hot springs, in the concentrated brine of salt pans, in the brackish water of estuaries and coastal lakes, and in the sea—from the supra-littoral region to the abyssal depths; some are active and free-living, others are inactive, sedentary, cryptic, or may be permanently attached; many of them are parasitic. Their external skeleton is often anything but "crusty", and in fact about the only obvious characteristic shared by all the many subgroups is that, at some time in their lives, at least some of their appendages are two-branched (biramous). (This is also a characteristic of the trilobites, but these, having been extinct since the end of the Palaeozoic era, are found only as fossils).

Perhaps the best way for a naturalist to define the crustacea (or any other group) is by giving a number of examples, for instance: water fleas (several kinds), barnacles, sand hoppers, sea lice, fish lice, slaters, pill-bugs, prawns, shrimps, crabs, crayfish, yabbies, and so on. This kind of definition is really a gallery of familiar images with which any unfamiliar animals can be compared.

Almost everyone has some sort of image of the group, known as the decapod crustaceans, represented by the last five examples above, and there are several good reasons for this. One is that many species in the group are used as food by man—regarded in some countries as a status symbol, according to a recent issue of *Australian Fisheries Newsletter*, a description which implies that quite exorbitant prices are demanded and paid for it. The group is obviously economically important, and from its use as food other characteristics of the species concerned can be inferred: they are numerous, fairly easily located and captured, and of a reasonably large size. Moreover there are said [12]† to be about 8,500 described species of decapod crustacean, most of which resemble the familiar food species and are therefore noticed and recognized.

The second largest group of crustaceans comprises about 4,000 described species [12], referred to collectively as the Isopoda. In contrast with the decapod crustaceans, these tend to be small, inconspicuous, of no value as food for man, and—with very few exceptions—of no economic importance.

Isopods in General

Gardeners and fishermen are the people most likely to know some isopods by sight, and the species they would know are the terrestrial slaters and pill-bugs (or "butcher-boys"), and the marine fish-lice. There is of course no need to point out to members of the F.N.C.V. that isopods are neither bugs nor lice; and they are not mites, although that name too

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† Figures in brackets denote references listed at the end of the article.

has been applied to some species. But it is better to explain what isopods are, than to say what they are not.

Isopods are members of the crustacean Class Malacostraca (the name used by Aristotle for all the Crustacea), which will be described here only by listing some of its better-known members. They are: mantis-shrimps; syncaridans, including *Koonunga cursor* (Vic.) and *Anaspides tasmaniae*; peracaridans, including mysids, cumaceans, amphipods, isopods, tanaids; eucaridans, including euphausids ("krill", or whale food) and the familiar decapods mentioned above.

Of the characteristics common to all the peracaridans, the oostegites of adult females are the most conspicuous. These are thin outgrowths at the bases of thoracic limbs. They form a brood sac within which the eggs are retained until they complete their development. The young when they emerge differ from the adults mainly in size, although there are groups in which a partial metamorphosis occurs, and isopods at first lack their hind pair of legs (but they manage to get around on the five or six pairs they already have).

Isopods are distinguished by having, in most cases, a depressed body more or less oval in outline; sometimes several tergites are fused, but there is never a carapace; the first pair of thoracic appendages is modified as maxillipedes, and the remaining pairs (seven in most cases) are usually all similar and adapted for walking or clinging. The eyes, which are present in most species, are never set on mobile stalks and in most cases are scarcely raised above the general surface of the head. The abdominal appendages (except the last pair—the uropods) are typically flattened or otherwise adapted for the exchange of respiratory gases; in some terrestrial species they contain a pseudo-tracheal system of fine tubes.

In their habits the free-living isopods tend to be retiring and many of them resemble their habitat in some way; others live in burrows excavated in various materials either by themselves or by other animals of about the same diameter, and there are some of similar inclinations to be found in the cavities of sponges, or in the interstices between worm tubes or the "roots" of seaweeds—the list could be extended.

Parasitism is not uncommon among the isopods, in fact a separate tribe (Epicaridea, Fig. 1e) has been established for several families of rather degenerate isopods which are parasitic on other crustaceans, and the members of several families in other tribes or sub-orders are completely, or partly, or temporarily parasitic—mostly on fishes, it seems. Some of the terrestrial species are found only as inquilines of ants or termites.

The distribution of isopods, throughout the world and its various habitats, is just as extensive as that of the Crustacea as a whole, except that there are few, if any, truly pelagic or planktonic marine forms.

Some Interesting Isopods

All categories used in the classification of animals, above the level of species, are based on opinion—the informed opinion of specialists. In the latest classification of the isopods [5] there are only two sub-orders, which is a measure of the differences—apparent to amateur and specialist alike—between the single family comprising the first sub-order, and all other isopods.

The Sub-order Gnathiidea has an interesting history. Its present name comes from the generic name of the species, *Gnathia termitoides*, whose description was first published in the

Edinburgh Encyclopaedia of 1814 by a Mr. W. E. Leach. Following that, two other generic names (*Anceus* and *Praniza*) were bestowed on the same species, in descriptions by other authors, and these names too became the bases for family names. Leach's description of this new species, new genus and new family (Gnathionii, as he called it) was not accompanied by any illustration, and included only 56 words of description! Add to this the fact that the species in this family are polymorphic—the adult males and females differ from each other and from the juvenile forms—and it is easy to see why the naming of the group became confused.

The three forms of a single species are shown in Fig. 1a, b, c, d. The smaller of the two juveniles has recently emerged from the brood pouch, while the other is a fully-fed animal (probably a female) which is about to metamorphose into the adult form. I have found this species, at Airey's Inlet, in the tubes of a polychaete worm (identified as an undescribed species of *Rhamphobrachium* [6]) which burrows in marine limestone at or about low tide level. In each of several disused tubes which I dissected out there was a "family group" of one adult male, one adult female, and one fully-fed juvenile, assumed to be a female: a junior member of the "harem". (One of the most-studied gnathiids, *Paragnathia formica*, an estuarine species found in Europe, is said to have "harems" of ten or more females to each male [7].)

In the case of several species of gnathiid from other parts of the world, it is known that the juvenile stages are temporary ectoparasites (or micropredators) on fish, feeding by piercing the skin and sucking body fluids. There are several growth stages (instars), during each of which the animal finds a host and attaches itself, feeds to repletion, drops off, and moults [11]. As far as I am aware, there is no record of the host species of any Australian gnathiid, and this could be a very interesting investigation for any F.N.C.V. member with an established marine aquarium. Small rock-pool fish such as blennies and sucker-fish are possible hosts for the smaller stages, but it is also possible that local species can feed on anemones, polychaete worms, holothurians, nudibranchs or other readily accessible "bodies" in the littoral region.

This sub-order is further distinguished from the rest of the isopods by having only five pairs of thoracic limbs (peraeopods). The last (legless) thoracic segment is very much narrower than the rest and appears to be a part of the abdomen (pleon). The peculiar mandibles of the male are of course the characteristic on which Leach based his generic name. The mandibles of most species are considerably larger than those of the species illustrated.

Probably no other group of isopods has quite as many interesting features as the gnathiids, but let us look next at a genus first described by Mr. W. A. Haswell (who later became Professor of Zoology at Sydney), in 1884. The species is called *Eisothistos vermiformis* (see Fig. 2a, e.) and it is a member of the family Anthuridae, whose name is based on the "flowery" appearance of the tail-fan (Fig. 2f). In this species the characteristic feature of the family has become very strongly developed, and apparently serves the same function as the operculum of the serpulid worms whose tubes this isopod inhabits. In contrast with the tail-fan, which presumably takes the brunt of this animal's contact with the environment, the anterior part becomes in-

creasingly less robust towards the head, and the same is true of the legs.

It is interesting to speculate about the details of this animal's life, but it may be very difficult to get any real knowledge of it because the species is (in my experience) quite rare—I have found only two or three altogether. One of these was collected near Bastion Point, Mallacoota, about ten years ago, and the others at Airey's Inlet quite recently. However, it is possible that the population density is high enough somewhere in Victoria, or at certain times, to make them fairly readily available, and I think that this group too offers interested naturalists an opportunity to make unique observations.

The largest isopods are found among the fish parasites and predators. Of those that are permanently parasitic once they become adult, females of the Tongue-biter (*Codonophilus imbricatus*, Fig. 2b) and the Leather-jacket Louse (*Ourozeuktes owenii*, Fig. 2h) are probably the largest to be seen around the Victorian coast (the males are quite small). The largest I can recall having seen in the literature is a species of *Bathynomus* (a "sea louse"), one of which was taken by the F.I.S. "Endeavour" off Gabo Island at 200 fathoms; it is recorded by Hale [3] as being 119 mm. long and 45 mm. wide. At the other end of the scale are species which never exceed three millimetres in length.

In terms of complexity and number of species the family Sphaeromidae is the largest isopod group. Their name is derived from the fact that most of them can roll up into a more or less spherical shape. Everyone knows the terrestrial "pill bug". *Armadillidium vulgare*, and will probably think of that as an example, but it is not, for sphaeromids are all marine.

The animal which was the subject for the photo in the November *Naturalist* (**85**, 11) is a sphaleromid called *Cymodoce tuberculosa*, a species established by the Rev. T. R. R. Stebbing in 1873. This specimen was collected by Mrs. Jeanette Watson (who recently contributed two articles to the *Naturalist* on diving) on Crawfish Rock, which is off the northern coast of French Island. The species is apparently quite numerous in sponges at a depth of about 50 feet. The animal itself is only 5-6 mm. long, and in dorsal view (Fig. 2d) is quite unexciting. Hale included this species in his well-known "Crustaceans of South Australia", and it is remarkable that he did not refer to the very peculiar "teeth". The two in the centre are extensions of the epistome, but the five on each side are part of the basal joint of the first pair of antennae. Until living specimens are observed in more or less natural conditions, one can only speculate about the function (if any) of these projections. Perhaps it should be explained that the photograph is of a rolled specimen, so that we see both ends at once. The downward projections are uropods, and what looks like the rim of its burrow is the edge of a hole in some wax, used to support it for the photograph.

The terrestrial isopods—despite the superficial similarity of many of them to the sphaeromids—form a separate tribe, the Oniscoidea. All the Tasmanian oniscoids known at that time were described in 1961 [1], and many, perhaps all, Victorian species can be identified from that paper.

Also terrestrial are some of the Phreatoicidea, a peculiar group superficially resembling the amphipods. A species growing to about an inch and a half appears to be not uncommon in the damp forests of the Otway Ranges. A South Australian species, first collected by Professor Wood Jones, was

found in large numbers in the steaming hot water of an artesian bore. Some species of this group, especially those found in wells or other subterranean waters, have no eyes at all. Two other features of this group are of special interest: one is that it is a primitive present-day group, little different from the known fossils, and the other is that its distribution—in Australia, New Zealand and South Africa—tends to support the Gondwanaland theory of a formerly unified southern land mass.

There are at least two other tribes, known to be represented in Australia, which have not yet been mentioned. One species from the Tribe Asellota, which includes mainly small and delicate forms, is remarkable for the fact that it lives externally on another isopod, *Exosphaeroma gigas*, as a commensal.

The other tribe is the Valvifera. The best known of these are the "sea centipedes", so called for obvious reasons (Fig. 2c); but those I find most interesting are the members of the family Astacillidae (Fig. 2g). These animals, which Hale has called "skeleton-lice" occupy the same sort of niche as the rather similar amphipods called "skeleton shrimps" (Caprellidae), but in my experience they are very much less numerous. I have collected very few, and can recall only one in the collection of the National Museum.

This account, long-winded as it might appear to the reader, deals with the isopods in a very cursory and sketchy way, and includes little except odd details and examples selected mainly because they may be of some interest to the non-specialist. All of the groups and most of the species mentioned are either known to occur in Victoria, or have been listed by Hale as occurring in South Australia.

Studying Isopods

So far there appears to have been no work done specifically on Victorian isopods. Some of the reasons for this are implied in the introduction, but another and quite serious deterrent is the diffuse nature of the literature on this order. Recently (1961) a checklist and key to New Zealand isopods was published [5]. Although it does not include the terrestrial Oniscoidea, about 115 references are listed. A study [2] of the Tasmanian Oniscoidea lists over 100 references, and Monod, in his monograph [7] on the Gnathiidae, lists more than 300 references to this family alone.

These various publications referred to range in length from half a page to 667 pages, and are published in Latin, French, German, Dutch, Belgian, Swedish, Norwegian, Danish, Italian and several other languages, including English; some apparently are not available at any Australian library.

There are, however, several useful and fairly readily accessible publications, all in English. They are those of Green [1], Hale [2], Hurley [5], Naylor [8], and Nicholls [9]. Incidentally, Naylor's paper is the only one ever published (as far as I am aware) specifically on Victorian isopods; it lists twenty-six species which were found during the National Museum's survey of Port Phillip.

Collecting Isopods

One of the simple pleasures available to those interested in marine biology is to examine a collection of small marine forms made by using Barnard's formalin method [3]. Briefly, this method consists in soaking algae, small encrusted rocks, or anything else that could harbour small animals, in a bucket of sea water containing not more than an ounce of formalin (it is convenient to carry it in

small tubes each holding one dose). The following technique avoids the danger of formalin dermatitis for the collector and the killing of organisms on rocks and in pools.

Pour the formalin into an empty plastic bucket, then three-quarters fill it with sea water. Set the bucket where it won't spill into any enclosed pool, and lower algae or other material into it carefully. (Sufferers from formalin dermatitis always start with the belief that they are not affected by formalin.) Don't pack the material in too tightly. Leave the weed in the bucket for 10-15 minutes, then pour off the water through a short plankton net with a screw-off collecting tube. Do this where the formalin will be quickly diluted—*not* into a rock pool or over rocks. Refill the bucket with fresh sea water, and rinse each piece of weed carefully to dislodge animals before discarding it. The water is passed through the net and the catch is then washed into the tube.

Such collections should be drained of sea water within a few hours and preserved, preferably in 80% alcohol or methylated spirit, or in 5% formalin in sea water. If any histological examination is intended, the catch should be put straight into fixative.

Other sources of material and collecting methods are left to the reader's initiative, but one point might be mentioned: the material found on the beach after a storm, particularly if there has been an off-shore wind, is likely to include forms not normally accessible except by dredging or diving. The cavities of sponges and the branching holdfasts of uprooted seaweeds are always likely to contain something of interest.

It must now be confessed that the main reason for writing this article was not to entertain or inform the reader, but to recruit active naturalists (and I believe there are some members of the F.N.C.V. who will welcome an opportunity to be more active) to the task of collecting and recording our still incompletely known and at least partly undescribed marine invertebrate fauna. No one even knows how incomplete the record is.

In recent years the National Museum has been making organized collections in Port Phillip and—more recently—in Western Port. Interested volunteers have given some help, but it seems to me that members of the F.N.C.V. should be forwarding a steady stream of material to known workers on particular groups, or to the museum where it will be accessible to all serious students of our fauna. Perhaps this is happening, but in the isopod collection I can recall only one small group, labelled "Queenscliff, 1912. Master E. Coghill".

Which raises an important point: this is the bare minimum of information that should accompany any specimen—place, date and collector. Write in pencil and put the label *in* the container with the specimen.

Well, how about at least slipping a few specimen tubes into your pocket next time you go to the beach, or keeping some handy in the glovebox of your car?

From my own point of view, I should like to hear from a few people who live near, or visit, the Victorian coast, and who are interested and prepared to do some collecting. (Arrangements can be made about any expenses incurred). Of the world's 4,000 described species of isopod, fewer than 140 have been recorded for south-eastern Australia, and I know already of several Victorian species which have not yet been described.

This is one way in which *anyone* —no scientific training needed and very little effort—can make a useful contribution to scientific knowledge

[13]. Perhaps the possibility of making such a contribution could be used as an incentive in the field-work of classes doing the new B.S.C.S. Leaving Biology.

Acknowledgments

My colleague, Mr. W. A. Jackson, took the photograph of *Cymodoce tuberculosa* which appeared on the cover of last month's *Naturalist*, and I am very grateful for his collaboration.

References

[1] Green, Alison J. A., 1961. A study of Tasmanian Oniscoidea (Crustacea: Isopoda). *Austr. J. Zool.* 9 (2): 258-364, figs. 1-292.

[2] Hale, H. M., 1929. The Crustaceans of South Australia. *Handbooks of the Flora and Fauna of South Australia.* Pt. II: 201-380, figs. 232-381.

[3] Hale, H. M., 1940. Report on the Cymothoid Isopoda obtained by the F.I.S. "Endeavour" on the Coasts of Queensland, New South Wales, Victoria, Tasmania, and South Australia. *Trans. Roy. Soc. S. Austr.* 64 (2): 288-304, pl. 18, figs. 1-8.

[4] Haswell, W. A., 1884. On a new Crustacean found inhabiting the tubes of *Vermilia* (Serpulidae). *Proc. Linn. Soc. N.S.W.* IX, 3: 676-680, pl. 36-37.

[5] Hurley, D. E., 1961. A checklist and key to the Crustacea Isopoda of New Zealand and the Subantarctic Islands. *Trans. Roy. Soc. N.Z. (Zool).* 1: (20), 259-292.

[6] Jensz, R. L., 1967. Personal communication.

[7] Monod, Th., 1926. Les Gnathiidae. Essai Monographique (Morphologie, Biologie, Systématique). *Mém. Soc. Sci. Nat. Maroc,* 13: 1-667, figs. 1-277, 1 plate.

[8] Naylor, E., 1966. Port Phillip Survey 1957-1963: Isopoda. *Mem. Nat. Mus. Vict.* 27: 183-198, 377-384, figs. 1-5, charts 1-2.

[9] Nicholls, G. E., 1943. The Phreatoicidea. Part I.—The Amphisopidae. *Pap. & Proc. Roy. Soc. Tasmania,* 1942: 1-145, figs. 1-34.
Nicholls, G. E., 1944. The Phreatoicidea. Part II.—The Phreatoicidae. *Pap. & Proc. Roy. Soc. Tasmania,* 1943: 1-156, figs. 35-80.

[10] Nierstrasz, H. F., & Brender à Brandis, G. A., 1923. Die Isopoden der Siboga-Expedition. II. Isopoda Genuina. Unterordnung Epicaridea. *Siboga-Expeditie Monogr.* **32** *b*: 55-124, pls. IV-IX.

[11] Pierre, F., & Théodoridès, J., 1947. La cohabitation de *Dichiratrichus pubescens*, de *Bledius spectabilis* et *Paragnathia formica* dans le Scharre, a l'estuaire de la Penzé (Finistere). *Bul. Soc. zool. Fr.* 71: 151-156, figs.

[12] Waterman, T. H., and Chase, F. A. Jr., 1960. General Crustacean Biology. *In* Waterman's *Physiology of Crustacea.* I: 1-33.

[13] For further information about the gaps in our knowledge of the local fauna, *see also*:
McKeown, K. C., 1942. *Australian Insects,* Royal Zoological Society of N.S.W., Sydney.
Williams, W. D., 1968. *Australian Freshwater Life,* Sun Books, Melbourne.

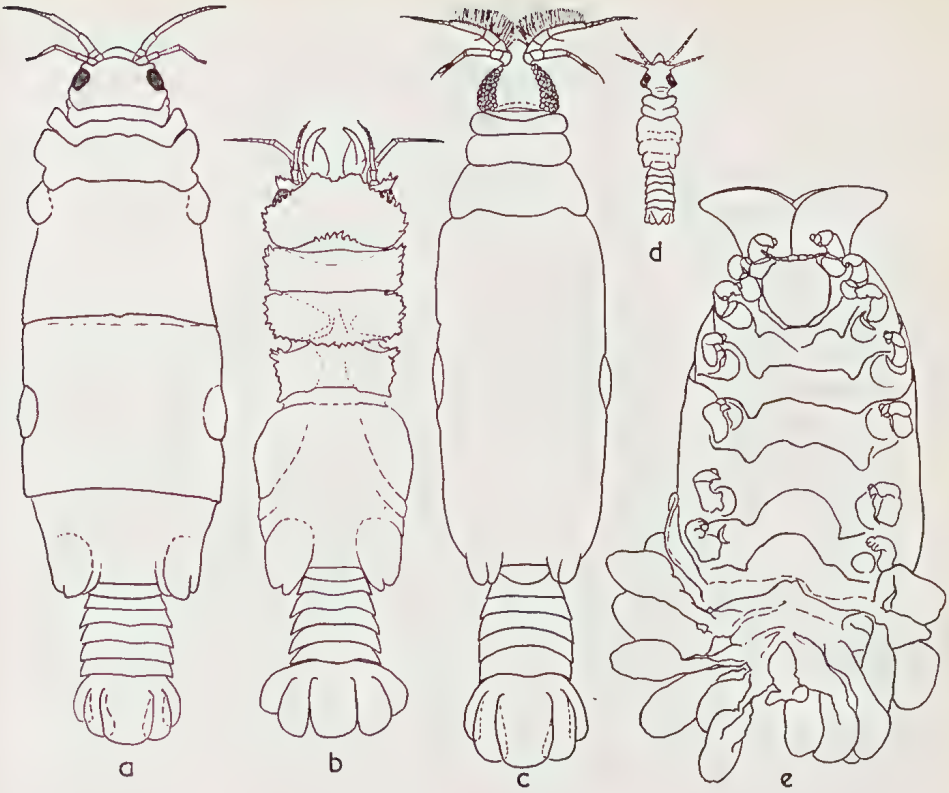

FIGURE 1

a-d. A gnathiid found in the tubes of polychaete worms. Its range is known to extend at least from Cape Otway to Western Port. **a**. Mature female. with fully-developed young (not shown). **b**. A recently-metamorphosed adult male (all of the many hairs and most of the dorsal sculpturing have been omitted from this drawing). **c**. A fully-fed juvenile. **d**. A juvenile which has just emerged from the brood-pouch. (**a-d.** × 18) **e**. *Parathelgese weberi*, dorsal view of a gravid female. Distention of the brood-pouch has forced all legs to the dorsal surface. Appendages at the lower end are the respiratory pleopods. (**e** × 6, after Brender à Brandis.)

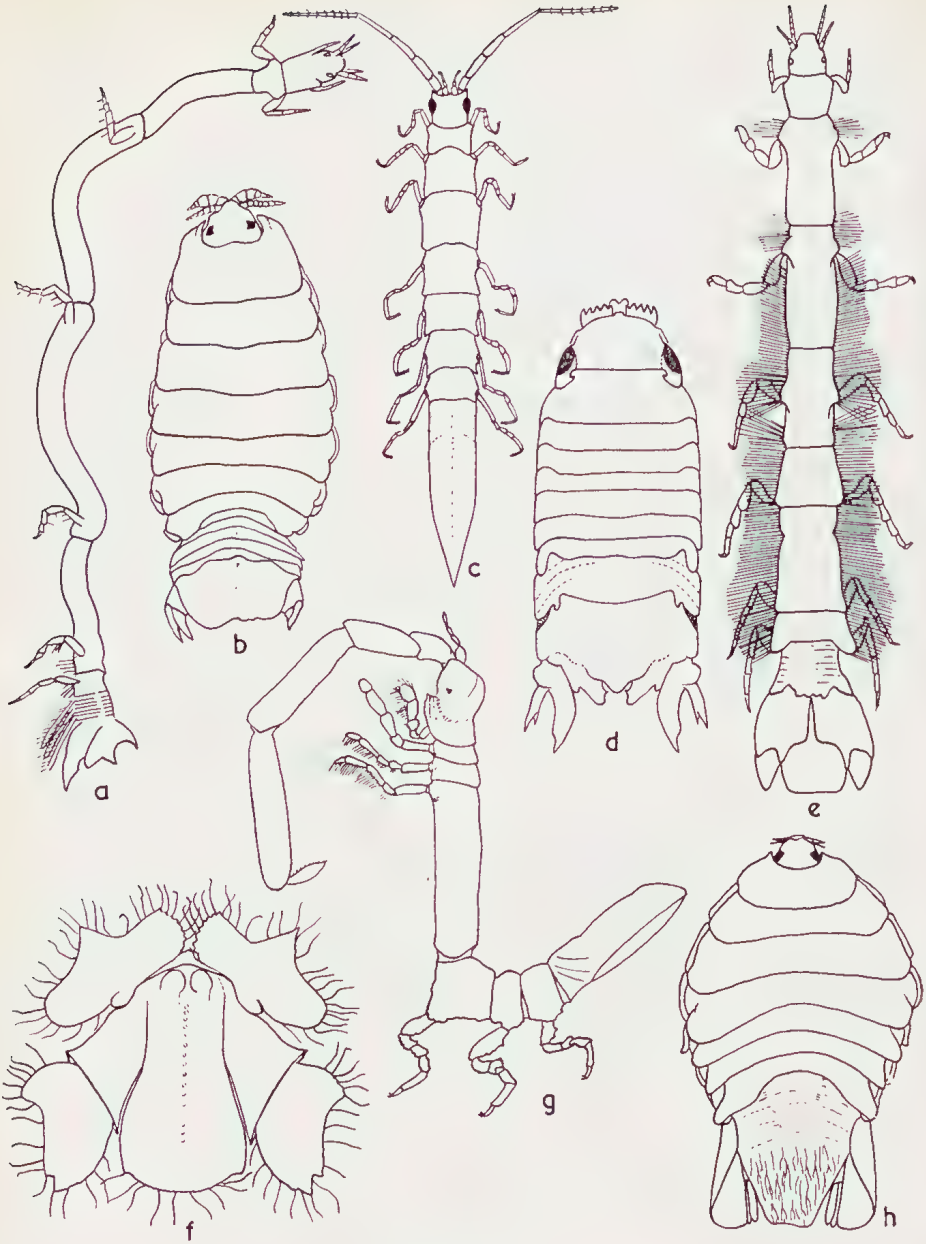

FIGURE 2
(Listed in the same order as they appear in the text.)

a. and **e.** Male and female of *Eisothistos vermiformis* (both × 8, after Haswell. Presumably Haswell erred in showing the male with no legs on the fourth thoracic segment and two pairs on the sixth).
f. Tail-fan of a species of *Eisothistos* found at Mallacoota (× 30).
b. The Tongue-biter, *Codonophilus impricatus*; **h.** the Leather-jacket Louse, *Ourozeuktes owenii* (**b** × 1¼, **h** × 2, both after Hale).
d. *Cymodoce tuberculosa*, dorsal view (× 7).
c. The Blue-spotted Sea-centipede, *Euidotea caeruleotincta* (× 2½, after Hale).
g. The Warty Skeleton-louse, *Parastacilla truculenta* (× 4, after Hale).

Book Reveiw

Field Guide to the Alpine Plants of New Zealand

by JOHN T. SALMON

Published by A. H. and A. W. Reed

8¼" x 5", 328 pages. 477 colour plates, and two maps. Printed on high quality art paper, with stiff cover and protective transparent jacket. Price in Australia: $5.60.

Botanists and other plant lovers owe a great debt of gratitude to Professor Salmon, D.Sc., F.R.S.N.Z., F.R.P.S., of the Victoria University of Wellington, who, in his scientific career as an entomologist, saw the need for adequately illustrated guides to the flora to serve the purpose of quick identification of plants met with in the field. Hill skill as a photographer enabled him to produce the large volume 'New Zealand Flowers and Plants in Colour', with 543 plates now increased to 630 in the currently available second edition ($6.50).

The author has now produced an excellent handbook to the alpine flora of his homeland in a format admirable for carrying on field trips, with clear and faithful reproductions of an astonishing number of his colour slides. A particularly useful feature is the illustrating of many of the species in flower (taken in the summer months for these alpines) and in fruit (autumn months), in some cases showing the latter in different colour forms from separate areas, and there are no fewer than 35 ecological or habitat plates.

As in his former book, the new volume is arranged on an ecological basis, with six divisions: subalpine and alpine scrub, tussock and carpet grasslands, screes, rocky and stony places, bogs and swamps, streamsides, damp or shaded places, herbfields and fellfields, illustrating the plants of these various habitats in turn, and ending with a chapter summarizing the characteristics of each type of alpine vegetation.

As one of the increasing number of Australians who have visited New Zealand, I wish I had had such a volume as this when enjoying the splendours of the high country there, and it can be recommended to future visitors, whether botanists, field naturalists, bushwalkers, yes, and skiers too, as indispensable. Australians can enjoy alpine flora in the Snowy Mountains, our own Victorian Alps, and in Tasmania, but the number and diversification of species and genera in New Zealand is incomparably greater, with its higher proportion of mountain areas of sufficient altitude allied to the latitude factor. Australia has only two species of *Celmisia*, but New Zealand has 58, of which 33 are illustrated in this book. There are only three Australian species of *Aciphylla*, but there are 39 species in New Zealand, where they are usually called Spaniards (with species differentiated by epithets such as Wild, Fierce and Horrid!). Unknown to our alpine regions are the remarkable plants known as Vegetable Sheep, such as *Haastia pulvinaris*, *Raoulia eximia*, *R. mammillaris*, and *R. rubra*, all of which are illustrated, as are the Penwiper Plant (*Notothdaspi rosulatum*), Mountain Cress (*N. australe*), both highly scented plants, and two species of Edelweiss, *Leucogenes leontopodium* (from the North Island) and *L. grandiceps* (from the South Island)—the Australian so-called Edelweiss is

Ewartia, while the Edelweiss native to the European Alps and the Andes is *Leontopodium alpinum*.

The publishing firm of Reeds are to be congratulated on this latest of the many attractive colour books on natural history they are making available. It is pleasing to see Professor Salmon's acknowledgment of the help given by Messrs. Don Sinclair and Ray Richards, who did so much towards the success of the recently published book "Flowers and Plants of Victoria", which was inspired by his earlier volume.

J. A. BAINES

* * * *

Pascoe Vale Junior F.N.C.

Following the first report from this keen little group of naturalists, this second one was sent to our Secretary, Mr. D. Lee—

Dear Mr. Lee,

I am writing to thank you for sending us three copies of the "Victorian Naturalist". We were thrilled with the articles about us, and it aroused much enthusiasm.

Although we were on the lookout for possums and searched Fawkner Cemetery (the obvious spot to find possums), we failed to find any trace of the animal.

Leaving out Sugar Gums, because they were introduced into Melbourne, there are seemingly old Eucalpyts at Napier Park (cnr. Napier and Woodlands Sts., Essendon), Fawkner Cemetery, Queen's Park (Mt. Alexander Rd., Moonee Ponds); and old River Red Gums occur in paddocks off Camp Rd. (Broadmeadows).

A strip of land beginning at the corner of Pascoe Vale Rd. and Fletcher St., also has some old Eucalpyts.

On 22 September, the Club had a Native Plants sale on my front lawn. The sale was very successful, and we sold over 40 plants at cheap prices, including Honey-Myrtles, Gums, Bottlebrushes, Wattles, Correas, and many others.

The money which we raised from the sale will be used to buy plants which we are unable to grow at present.

About five weeks ago, by arrangement with the Coburg Council we planted 20 of our Flowering Gums, Honey-Myrtles and Hakeas along the factory boundary of Essex St.

Yours sincerely,
KELVIN THOMSON,
President.

Field Naturalists Club of Victoria

General Meeting—11 November, 1968

An extraordinary meeting was held prior to the general meeting, to consider the application of the Upper North-east F.N.C. to become affiliated with the F.N.C.V. The Secretary moved and Mr. Swaby seconded the motion that the application be approved, and the meeting voted in favour.

The general meeting began with the announcement of the death of Mrs. J. J. Frame, a devoted member from 1932 to 1968. She was granted Honorary Membership in 1950 for work done on behalf of the F.N.C.V. and Hawthorn Juniors. Mrs. Frame always assisted with the Nature Show, and showed a particular interest in the Marine Biology exhibit.

One minute of silence was observed.

The President informed the meeting of the 94th birthday of another valued member—Mr. Vic. Miller of St. Kilda.

Having been approved at Council meeting, the minutes of the previous general meet were taken as read on the motion of Mr. Morrison.

The applications for membership which appeared in the *Victorian Naturalist* for November were approved and accepted.

Correspondence was received from Mr. Dunbavin Butcher, regarding the decision of Mr. Hamer to refuse an application from a quarrying company to operate near Cape Woolamai. He said that it was vital to preserve this area in its natural state.

Mr. and Mrs. McKellar represented the F.N.C.V. at a meeting of the F.N.C.'s from Western Victoria to discuss the possible amalgamation of all F.N.C.'s into one body.

The President introduced the speaker for the evening, Mr. Ellery Hamilton-Smith, who opened his lecture by way of a short introduction into the study of caves (*speleology*).

This is a relatively new science in Australia, having been developed only over the past 20 years; but in England and Europe, particularly in France, the systematized study of caves has been in progress since the latter half of the 19th century.

France is recognized as the world centre on speleological interests largely because of the great reliance placed upon cave waters for their cities' supply. This being the case, of course a study had to be made of the origin of these sources of water. France also has some of the world's deepest caves.

There are seventeen recognized societies in Australia, linked together under the Australian Speleological Federation which was formed in 1956. This in turn is affiliated with the International Union of Speleology, which will be holding its 5th Annual Congress next year in Stuttgart.

Four important factors of speleology were then listed by the speaker—

(i) Conservation was essential because of the irreplacable scientific data contained in caves, not only in the form of fossil remains, but also in living fauna existing in a delicate state of ecological balance, very easily exterminated, and of considerable scientific importance. Often it is a relict fauna, and provides valuable clues to the evolution of surface dwelling forms such as insects.

Caves are really a living laboratory, easily rendered useless by carelessness; and this may happen even with the best of intentions. An example of this was given when after two years of effort, a way into a major cave system in eastern Victoria was finally found. This was through a hole just large enough for one body to squeeze through. On entering, the 180 foot long and 100 foot wide cave was extremely humid, with walls dripping wet. A particularly fascinating array of fauna was within this cave, and one species of millipede hitherto unknown outside of New Zealand was collected.

Four weeks later, when the party returned to the site, the walls were bone dry, most of the fauna had gone, and so without intention, the environment of the cave had been destroyed.

When this is compared with the things done to caves in the name of "tourism", or by various mining companies, or thoughtless visitors, it may be understood why concern is felt about conservation.

The education of, and public relations with landowners or others res-

ponsible for the care of caves, is essential. Caving has become a bit too popular as a sport which results in people wandering over properties looking at caves to get a thrill. For this reason, landowners are encouraged to recognize identification cards of members of the associations in order that blame for any damage is levelled in the right direction, and not at clubs.

At present, and at their own expense, the Association is placing notices inside the entrance to caves in the Buchan area, stressing for visitors the importance of conservation, and also the importance of obtaining permission from landowners before entering.

Safety along cave explorers is emphasized, and in Australia only one fatality has occurred.

However, "caving" can be dangerous and therefore the association educates its members to study caves in a safe manner, and also sets up the kind of organization which will enable the rescue of anyone in trouble.

Recording of work done in caves is a necessity of cave exploration, in that it prevents overlapping of knowledge gained from any particular cave. Therefore the Association carries out this work as well.

The speaker then gave a very brief and general description of the definition and formation of caves. The speleologist defines a cave as somewhere that one can get out of sight of daylight. Therefore rock-shelters do not come into the field of speleology, but are confined to their own specialized study.

The formation of limestone caves (the most common type), in very brief and simplified terms occurs through the soaking of rainwater carrying dissolved carbon dioxide and soil acids through the soil, thus dissolving away limestone, leaving cavities which form caves. The process is of course more complex than this.

Another form of cave of importance in Victoria is the lava cave, which occurs in some numbers in the western portion of the State.

Other types of cave formation include the solution of sandstones to form cavities; those due to earth movements; and those formed by landslide into a valley carrying a stream, which in turn washes out a cavity underneath the landslide material.

At this stage, Mr. Alan Morrison took over the projector to show a series of slides showing the beauties of cave decoration in different forms. Mr. Hamilton-Smith gave a commentary as the slides were shown. Included among the slides were details of where caves occurred throughout Australia and showed the Barkly Tablelands-Katherine-Chillagoe areas in Queensland; the limestone portion of the Great Divide in N.S.W.; Buchan and Western District of Victoria; Mole Creek-Hastings Ida Bay areas in Tasmania; the Flinders Ranges-north-east-Gawler Range areas in South Australia; and the Nullarbor and west coast areas of Western Australia

Particular slides of great interest included an oddity in cave formation at Avalon near Sydney, where a volcanic dyke in sandstone, away from which the sandstone had been eroded, thus leaving a cave of 300 ft. in length. Other slides showed the "Grand Arch" at Jenolan, as well as the "Devil's Coach House" and "The Orient". The latter was said to be as beautiful as any such cave in the world.

A group of "cave-pearls" were shown, and these are formed by grains of sand

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becoming coated with concentric layers of calcite, while lying in a small pool of water which is quite often kept in a state of agitation by the constant dripping of water. Unfortunately, "cave-pearls" are susceptible to souveniring.

Still other slides portrayed some of the difficulties encountered in cave-exploration, with 100 foot and more ladder drops, thick waist-deep black mud, and water-filled tunnels all but for 3 or 4 inches of space at the ceiling, along which one has to swim on one's back with one's nose breathing from the small space above water level.

Another aspect shown was of the importance of caves for the breeding of bats; and in particular, reference was made to a cave near Naracoorte where the Bentwing Bat breeds. It was interesting to learn that the newly born bats without fur, are placed in the centre of the cluster hanging from the ceiling, in order that they obtain most warmth. It appears that caves are chosen for breeding which contain warm pockets of air near the ceiling.

Indeed the whole lecture was most informative and intriguing, and was brought to an end only by the lack of time.

At the conclusion of the talk, Mr. Allen thanked Mr. E. Hamilton-Smith for a most unusual and interesting theme, not so well known to club members, and a subject evidently for those who are physically and temperamentally fit. Questions were called for and the audience should their intense interest by asking many.

Correspondence

Letter from Mr. McNamara, 15 Dendy Street, Brighton, requesting information on sightings of the Thylacine, Wonthaggi Monster, and Striped Tiger-cat.

The School of Forestry, University of Melbourne, extended an invitation to attend a seminar to he held at the School of Agriculture, Melbourne University on "The Role of Fire in Plant and Animal Ecology".

Letter from the Public Reserves Protection League opposing the granting of Leases of Crown lands and river frontages to private persons—in particular one bordering on the Mt. Buffalo National Park.

Letter from Mr. A. Dunbavin Butcher regarding request for donation to purchase John Gould bird prints to be placed in the Arthur Rylah Wildlife Research Institute at Heidelberg. Council considered this request, and decided to make $100 available to purchase 2 prints, preferably of mammals.

Referring to an article published in the *Age* referring to the establishment of a wood-chip industry in Australia, the Secretary asked if members could provide any information about the processing, and areas likely to be affected.

Excursion Secretary

Miss M. Allender reported that there were several vacancies for the Christmas trip to Traralgon.

Miss Allender gave notice that a trip to W. Aust. was being planned for the end of August 1969.

General Business

Miss Young directed members to an *Age* article on the unrestricted use and possible consequences of insecticides and pesticides.

Mrs. Taylor gave notice of a N.P.A. meeting on 27th November. Speaker Dr. Mowles and also showed a pamphlet published by the Western Victoria Conservation Committee, stating the case for a Lower Glenelg National Park and containing a list of birds, plants and mammals of the area. Cost $1.00.

Mr. Baines referred members to 2 library books on the 16th century work of Naturalist W. Lurnen, particularly in regard to botanical nomenclature. He also referred to a Graham Pizzey article stating that the Western District Parks at Lower Glenelg and the Little Desert had been established and if this was so, suggested letters of approval be sent to Sir W. McDonald and the Western Victorian Conservation Committee on behalf of the Club. Mr. D. Lee read an extract from a report from the Land Utilization Council outlining a proposed plan for the Kentbruk area for future agricultural use and reserves.

Mrs. Bridges-Webb asked a question on whether the 12 mile limit would include all sections of the Barrier Reef and if foreign industries could be established there unopposed. Dr. Wanliss gave information on the latest moves and proposed plans for conservation of this area.

Mr. E. Hanks requested speakers for the members night to be held at the January meeting. Each to be limited to 10 minutes and names of intending speakers to be given at the December Meeting.

Nature Notes and Exhibits

Mr. E. Allen displayed a collection of sponges gathered at the Nobbies and a fresh leaf from a lemon tree. Mr. Swaby exhibited an excellent collection of potted bog plants. Mr. R. Condron showed a male and female Birdwing Butterfly from the Solomon Islands.

Mr. P. Curlewis showed an interesting old book on herbs obtained from a second hand shop.

Mr. L. Sault displayed 3 species of Bladderwort and a pigmy Sundew collected at Dromana.

Mr. I. F. Morrison showed a specimen of *Eremophila maculata* grown from a cutting.

Two Amy Fuller Paintings were displayed.

Botany Group Meeting
14th November

Twenty-seven members were present and Mr. Fairhall was in the chair. The speaker for the evening was Miss Helen Aston and her subject was "Botanical Terms and Keys made easy".

A summary of Miss Aston's lecture follows:

This talk was prompted by the thought that the average naturalist is eager to learn how to identify native plants but is frightened away by the sight of the bewildering keys and descriptions, full of strange terms, which he finds in any flora book describing the plants of a region he picks up. Hence it was designed to help the very beginner to understand and use keys and descriptions so that they become meaningful to him, and something he can derive much benefit from without undue effort.

First, it was explained that botanical terms must be used in descriptions if an author is to give a fully-informative account of a species, sufficient for it to be distinguished from all others—so botanical terms are here to stay. They allow both preciseness and clarity, and to demonstrate this, two descriptions of the same leaf were read. That using botanical terms consisted of 6 words, while that using only every-day words had to be extended to 32 in order to give the same detail of description.

Secondly, the way to read through descriptions and get a good visual picture in one's head of the plant concerned was demonstrated. A description of a plant was read slowly, portion by portion (leaf, peduncle, spathe, flower, flower parts, etc.), while members of the audience concentrated on sketching on plain paper provided, the plant as they visualized it from the description. A fair amount of time was spent on this, with any botanical terms being explained as they were met with, and finally the audience were told that the description fitted *Ottelia ovalifolia*, the Swamp Lily, and were shown an illustration to compare with their own. Some of the audience sketches were considerably accurate, indicating the benefits of this thoughtful, piece-by-piece approach to a description. It was suggested that audience members should obtain descriptions and practise this exercise at home.

Thirdly, emphasis was placed on the importance of keys as a means of quickly narrowing down the possibilities when one is attempting to identify a plant. Copies of a short key set out in two different, commonly-used ways were distributed, and the ways to use this, both forwards and backwards, were explained. For practice, the key was used in conjunction with several plant sketches, the audience keying in unison.

Finally the importance of familiarizing onself with the basic botanical terms and their meanings was stressed, and a list of approximately 230 of the most commonly used terms distributed. It was suggested that the beginner learn these thoroughly first, then later add others as met with. Good glossaries (dictionaries of terms) with helpful illustrations occur in most good floras, and those found in *Handbook of the Vascular Plants of the Sydney District and Blue Mountains* by Beadle, Evans, and Carolin and in *A Flora of the Marshes of California* by H. L. Mason are particularly worthwhile.

Mr. Fairhall thanked Miss Aston on behalf of members for her very interesting and helpful talk.

Exhibits: Mr. Neeve brought in some fine plants including *Melaleuca fulgens*, *Eriostemon spicatus*, *Bauera rubioides* (double flowered), *Boronia floribunda* and *B. ovata*, *Darwinia ericifolia* and *D. gradiflora*, *Leschenaultia biloba* and *Leptospermum lanigerum*, var. macrocarpa.

Next meeting: Thursday, 12th December. Members' Night, followed by supper.

F.N.C.V. DIARY OF COMING EVENTS

GENERAL MEETINGS

Monday, 9 December—At National Herbarium, The Domain, South Yarra; commencing at 8 p.m.

1. Minutes, Reports, Amendments.
2. Correspondence.
3. Subject for the evening—"Wildflowers of the North". Mr. A. Morrison.
4. New Members
   (a) *Ordinary:*
   Mrs. I. Owen, Flat 6, 45 Park Street, East Brunswick. (Interest: Marine Biology and Geology.)
   Mr. David Rosenbery, Lot 8, Jalna Court, Eltham.
   (b) *Junior:*
   Phillip Sutherland, 18 Wilson Avenue, Montmorency. (Interest: Fauna and Flora.)
   (c) *Country:*
   Mrs. L. B. Kirk, "Koonalunda", Cope Cope. (Interest: Botany.)
5. General Business.
6. Nature Notes and Exhibits.

Monday, 13 January—Members' Night. Organized—Mr. E. Hanks.

Monday, 10 February—"Echidnee". Dr. E. M. H. Ealey.

GROUP MEETINGS

8 p.m. at National Herbarium undess otherwise stated.

Thursday, 12 December—Botany Group.

There will be no other group meetings between the December and January general meetings.

F.N.C.V. EXCURSIONS

Sunday, 15 December—Anglesea. The coach will leave Batman Avenue at 9.30 a.m. Fare $2.00. Bring two meals.

26 December-1 January—Traralgon. The coach will leave Flinders Street, outside the Gas and Fuel Corporation at 9 a.m. Bring a picnic lunch. The coach fare $16.00 should have been paid but any still outstanding should be paid at the December general meeting.

29 August-21 September—It is hoped to have an excursion to Western Australia at this time if sufficient members are interested. The party would leave by train Friday evening and arrive in Perth on Monday morning. A coach would be chartered and the party would travel to the Geraldton area for a few days, then south to Albany across to Busselton and back to Perth to catch the return train on Thursday arriving back in Melbourne on Sunday 21 September, 1969. Accommodation would be on a Dinner, bed and breakfast basis and members would be responsible for their own lunches. The cost would depend upon the number going but should not exceed $260.00 for train, coach and accommodation. As this trip will be dependent upon enough members wanting to go, those interested should notify the excursion secretary as soon as possible.

Field Naturalists Club of Victoria

Established 1880

OBJECTS: To stimulate interest in natural history and to preserve and protect Australian fauna and flora.

Patron: His Excellency Major-General Sir Rohan Delacombe, K.B.E., C.B., D.S.O.

Key Office-Bearers, 1968/69

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Mr. E. R. Allan

Vice-Presidents: Mr. Jeffs, Mr. T. Sault

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Geology: Mr. T. Sault, 9 The Avenue, West Rosebud.

Microscopical: Mr. M. H. Meyer, 36 Milroy Street, East Brighton (96 3268).

Mammal Survey: Mr. P. Homan, 40 Howard Street, Reservoir 3073

Entomology and Marine Biology: Mr. J. W. H. Strong, Legislative Council, Parliament House. Melbourne, 3002.

MEMBERSHIP

Membership of the F.N.C.V. is open to any person interested in natural history. The *Victorian Naturalist* is distributed free to all members, the club's reference and lending library is available, and other activities are indicated in reports set out in the several preceding pages of this magazine.

New Rates of Subscriptions for 1968

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All subscriptions should be made payable to the Field Naturalists Club of Victoria, and posted to the Subscription Secretary.

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